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VOL. II.—30TH YEAR. SYDNEY, SATURDAY, NOVEMBER 27, 1943. No. 22.

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Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— Page.
Studies in the Deposition of Lead in Bone: II. Calcium-Phosphorus and Lead-Phosphorus Ratios, by F. R. Barrett, M.Sc. .. 433
The Syndrome of Appendicitis, with Special Reference to the Absence of Signs in the Right Iliac Fossa, by C. Craig, M.D., M.S., F.R.A.C.S. 435
Mycotic Ear Infections at an Advanced Allied Base, by Eric L. Davis .. 437
A Method of Treatment of "Tropical Ear", by H. Earnshaw .. 438

REPORTS OF CASES—
Two Complications of Prophylactic Sulphonamide Therapy, by B. K. Rank and A. Murray Clarke 439
Post-Mortem Delivery of Twins by Forceps and Manual Manipulation, by Robert M. Allport .. 441

REVIEWS—
War Aims .. 441
Sulphonamide Therapy .. 442
Regional Anatomy .. 442
Food Allergy .. 442
Psychological Medicine .. 442

LEADING ARTICLES—
Housing in Australia as a Post-War Problem .. 443

CURRENT COMMENT—
Headaches .. 445
The Action of the Sulphonamides: Some Limitations 445

ABSTRACTS FROM MEDICAL LITERATURE— Page.
Bacteriology and Immunology .. 446
Hygiene .. 446

BRITISH MEDICAL ASSOCIATION NEWS—
Scientific .. 448

MEDICAL SOCIETIES—
Medical Sciences Club of South Australia .. 449

NATIONAL EMERGENCY MEASURES—
National Security (Medical Coordination and Equipment) Regulations .. 449

CORRESPONDENCE—
The Nervous Soldier .. 450
An Epidemic of Polyarthritis in the Northern Territory .. 451
Rubella and Congenital Deaf-Mutism .. 451

AUSTRALIAN MEDICAL BOARD PROCEEDINGS—
Queensland .. 451

OBITUARY—
Alexander Leiper .. 451

NOMINATIONS AND ELECTIONS .. 451
MEDICAL APPOINTMENTS .. 452
BOOKS RECEIVED .. 452
DIARY FOR THE MONTH .. 452
MEDICAL APPOINTMENTS: IMPORTANT NOTICE .. 452
EDITORIAL NOTICES .. 452

STUDIES IN THE DEPOSITION OF LEAD IN BONE.

II. CALCIUM-PHOSPHORUS AND LEAD-PHOSPHORUS RATIOS.[1]

By F. R. BARRETT, M.Sc.,

From the School of Public Health and Tropical Medicine, University of Sydney.

CONSIDERABLE attention has been given to the influence of calcium and phosphorus on lead metabolism. More recently Sobel and his collaborators[(1)] conclude that the influence of all three dietary factors—namely, calcium, phosphorus and vitamin *D*—must be considered in the biochemical behaviour of lead in young rats. They stress the importance of the lead-phosphorus ratio.

Lederer and Bing[(2)] have found that the level of phosphorus in a diet containing small amounts of lead fed to young rats has no effect on the lead content of the femora, and that the addition of calcium to the diet has no effect on the lead content of the femora, liver and kidneys when lead is given intraperitoneally. These workers conclude that calcium inhibits the absorption of lead from the intestinal tract, thus confirming Tompsett's finding with adult mice.[(3)]

The object of this paper is the consideration of calcium-phosphorus and lead-phosphorus ratios in relation to lead absorption and deposition, and the conditions under which they affect these processes.

Materials and Methods.

A non-cereal diet was devised to eliminate the uncertain factor of phytic acid phosphorus. This "purified" diet was described in a previous paper.[(4)] The four experimental diets used are shown in Table I. The lead was added in the form of basic lead carbonate. A surfeit of lead was used to offset the intestinal effect of added calcium on lead absorption. The phosphorus was added as anhydrous disodium phosphate, and the calcium as calcium carbonate. Each rat received 600 international units of vitamin D_2 per week.

TABLE I.
Experimental Diets.

Diet.	Calcium. (Percentage.)	Phosphorus. (Percentage.)	Lead. (Percentage.)
A (basal)	0·02	0·13	—
B (basal, leaded) ..	0·02	0·13	0·80
C (high phosphorus content, leaded) ..	0·02	0·73	0·80
D (high calcium content, leaded)	0·82	0·13	0·80

The same technique was employed as described in previous studies. The bone figures represent the sum of the bone fractions. The average number of animals in each group was eleven.

Results and Observations.

Growth was poor in the groups receiving the leaded diets, although none of the animals lost weight. The animals in these three groups consumed approximately the same amount of food, which was somewhat less than that consumed by the group not receiving lead. Towards the end of the experiment the group B rats were in poor condition and had begun to eat less; all the animals were then sacrificed.

A summary of the analyses is presented in Table II. Group E (normal rats) represent weanlings from the same litters weighing 50 grammes; that is, they correspond to the animals used in the experiment just before these were placed on the experimental diets.

Comparison with group E shows that calcification took place in the bones of the basal diet group (group A), although the increase in organic matter was relatively

[1] Accepted for publication on January 1, 1943.

greater; the percentage of ash in dry, fat-free femur was 43·6, against 46·3 for the normal pre-experimental bone. The reduction in ash percentage is due to the difference in body weights (86 grammes against 50 grammes).

The addition of lead to the basal diet resulted in a considerable reduction in ash weight, with no change in the ash percentage. Some unpublished alizarin experiments indicate that the rate of calcification was similar to that of the control group (group A), after allowance had been made for a slightly shorter bone owing to slower bone development. At least the same number of trabeculæ were seen, although the trabeculæ were finer. The serum calcium and inorganic phosphorus contents were similar, the calcium-phosphorus products being 58 and 60 respectively. These findings are in accord with bone fraction data,[1] which indicate that the group B animals were suffering from osteoporosis and not rickets.

The addition of phosphorus to the basal leaded diet resulted in a reduction in circulating lead and in lead deposition to nearly one-third (group C); this figure is in general agreement with Sobel's finding with a cereal diet. No significant difference in ash weight or in ash percentage was found. The amount of organic matter was similar to that of group B. Alizarin experiments and investigation of bone length revealed that any reduction in calcification was slight. The serum phosphorus level was raised to normal figures. The influence of the lead-phosphorus ratio appears to be restricted mainly to the intestine.

In spite of mobilization of compact bone calcium in groups B and C, with calcification similar to group A, there were no differences in the ash percentage of groups A, B and C, owing to the lack of gain of organic matter in the last two groups. These findings show once again that care is required in interpreting bone ash percentage, bone length, and possibly X-ray pictures in experiments with diets poor in calcium.

The addition of calcium to the basal leaded diet resulted in an appreciable increase in ash weight, to give a percentage ash of 52. The figure for normal rats of the same age is about 57%. This partial calcium-phosphorus imbalance is reflected in a significant, but not appreciable, reduction in bone lead, when this is expressed as milligrammes *per centum* of lead in organic matter. Circulating lead was maintained, the serum calcium level was raised to normal figures and the serum inorganic phosphorus content was reduced. The maintenance of circulating lead shows that the inhibiting effect of calcium on lead absorption found by other workers was offset by lack of interfering phosphorus in the intestine; that is, the intestinal lead-phosphorus effect on lead absorption was neutralized by the added calcium. The calcium-phosphorus-vitamin *D* system operated in this case.

It may be of interest to note that the organic matter in the bones of the animals in group D was increased to the same extent as that in group A, in spite of reduced body growth. On the other hand, investigation of groups B and C reveals no gain in organic matter.

Discussion.

The contradictory findings of the influence of calcium and phosphorus on lead deposition can be explained partly in terms of calcium-phosphorus ratios and partly in terms of lead-phosphorus ratios.

Aub, Robb and Rossmeisl[3] found no significant differences in lead deposition when lead carbonate was given by insufflation to cats receiving diets rich or poor in calcium. Their calcium-rich diet was prepared by the addition of milk to the calcium-poor diet; that is, there was adequate phosphorus as well. Similarly, Lederer and Bing[2] reported no essential differences in the lead content of the femora, liver or kidneys when lead acetate was given intraperitoneally to growing rats fed on diets rich or poor in calcium. These workers maintained the calcium-phosphorus ratio at 2·0 by altering the phosphorus content as well. They found that, when lead was added in small amount to the diet, lead deposition was decreased with increasing amounts of dietary calcium. They concluded that calcium inhibited the intestinal absorption of lead.

However, a further effect is claimed. The maintenance of circulating lead on the addition of calcium shows that, with a plethora of lead in the diet, the intestinal effect of added calcium on lead is neutralized by the resulting lack of available phosphorus. The effect, not so much of the calcium level of the diet as the high calcium-phosphorus ratio, accentuated in this case by dietary lead itself, can then manifest itself. Because of this partial imbalance calcification is below normal, lead deposition is reduced, circulating lead and calcium are at a high level and the level of inorganic phosphate reduced. In the corresponding experiments of Sobel *et alii* more calcium was added to the diet containing probably less available phosphorus; the imbalance was thus increased. Calcification is further below normal, and serum inorganic phosphate content and lead deposition are further reduced. Without vitamin *D*, Sobel obtained a gross reduction in bone ash and in lead deposition, although the circulating lead and serum phosphorus content were not significantly reduced. With a similar rhachitogenic diet, Behrens and Baumann,[4] using radio-active lead, showed that lead was limited to the zone of proliferating osteoid. However, from the findings of the present studies, it is considered that some lead was also deposited in the compact tissue.

The finding of Sobel and his collaborators,[1] that phosphorus added to a basal diet containing a considerable amount of lead but a negligible amount of calcium causes an appreciable reduction in circulating and deposited lead, is confirmed in this report. That decreased ossification does not explain the effect of phosphorus has been shown in the present studies. On the other hand, Lederer and Bing[2] found that the level of phosphorus in diets containing small amounts of lead did not affect lead deposition.

Further, when Sobel *et alii* added vitamin *D* to each of their imbalanced diets, both lead deposition and the amount of bone ash were increased. However, they found that the ratio of increase of lead over that of ash in each group varied considerably under the influence of vitamin *D*. Also, they observed that increases in blood calcium content under the influence of vitamin *D* did not parallel increases in the lead content of the blood. Therefore, these workers postulate an independent lead-phosphorus-vitamin *D* system, analogous to, but not necessarily going in the same direction as, the calcium-phosphorus-vitamin *D* system.

Now, it has been shown[5] that calcium and lead were being deposited together while calcium was being pulled from the compact bone, in which there was no lead.

TABLE II.

Summary of Blood and Bone Analyses.

Group.	Ash in Dry Fat-free Femora.		Lead. (Milligrammes *per Centum*.)		Serum. (Milligrammes *per Centum*.)		Lead in Whole Blood. (Milligrammes *per Centum*.)
	Milligrammes.	Percentage.	In Ash.	In Organic Matter.	Total Calcium.	Inorganic Phosphorus.	
A (basal diet)	38·3	43·6	—	—	7·3	8·3	—
B (basal, leaded diet)	29·7	43·1	892	676	7·2	8·1	0·66
C (high phosphorus content, leaded diet)	30·3	44·0	337	264	6·7	11·6	0·24
D (high calcium content, leaded diet)	53·6	52·0	511	554	10·3	6·5	0·64
E (normal 50-gramme rats)	34·5	46·3	—	—	—	—	—

Further, as a corollary to the foregoing discussion on the group receiving a diet rich in calcium, the effect of vitamin *D* on lead deposition and retention is secondary to that on calcium metabolism, when the calcium-phosphorus ratio is high.

In the case of the groups receiving diets poor in calcium, a lead-phosphorus-vitamin *D* system, restricted to the intestine, but not analogous to the calcium-phosphorus-vitamin *D* system, is postulated. In the presence of a negligible amount of calcium but a considerable amount of lead, there can be little doubt that added phosphate inhibited lead absorption. By means of vitamin *D*, Sobel obtained, in his group receiving a diet poor in calcium and phosphorus, a threefold increase in lead deposition corresponding to increased lead absorption, and no increase in serum calcium content, but an increase in serum inorganic phosphate content corresponding to a somewhat improved bone ash content. It is noted, however, that the dietary lead-phosphorus ratio in this group, when lead is expressed in calcium equivalents, is unity, whereas vitamin *D* requirements for growing rats are minimal when the dietary calcium-phosphorus ratio is 1·0.

In accordance with the foregoing general argument, Lederer and Bing's finding that phosphorus has no effect on lead deposition must be due to one of the following factors: (i) they included only small amounts of lead in the diet, so that the lead-phosphorus ratio would be already too low for either phosphorus or vitamin *D* to have any noticeable effect; (ii) or they used more than negligible amounts of calcium in their diets that were poorest in calcium. It is considered that the former explanation is more correct. In this connexion, it is pointed out that Tompsett[3] found no effect of vitamin *D* on lead storage. Lederer and Bing ascribe this to the fact that he used adult animals. It is noted, however, that small amounts of lead were used, so that the lead-phosphorus-vitamin *D* system would be ineffective; that he did not include a diet rich in calcium and poor in phosphorus (when, it was shown, the calcium-phosphorus-vitamin *D* system operates). A possible parallel to lead absorption is noted in Shelling and Joseph's work on iron, cited by Reed and others:[7] "Vitamin D, when fed to rats on a high-phosphorus diet, increased retention of iron but had no effect when the diet was high in calcium. No interpretations were suggested." Shelling[8] found that young rats receiving an adequate ration, to which was added 1·5% of basic lead carbonate with and without additional calcium carbonate or magnesium carbonate, fared worse than when vitamin *D* was withheld. When phosphorus was added to correct the imbalance, the animals thrived equally well with and without vitamin *D*.

Summary.

1. Data of the influence of calcium-phosphorus and lead-phosphorus ratios on the biochemical behaviour of lead in laboratory animals have been correlated. The contradictory evidence can be reconciled by postulating the following: (*a*) a lead-phosphorus-vitamin *D* system restricted to the intestine and operating when the diet contains a small amount of calcium, but a considerable amount of lead; (*b*) the influence of the calcium-phosphorus-vitamin *D* system. The disturbance in lead metabolism is ancillary to that in calcium and phosphorus metabolism.

2. From the point of view of practical nutrition, therefore, lead-phosphorus ratios appear to be of secondary importance. A high calcium-phosphorus ratio, as well as the calcium level of the diet, affects lead deposition in the young rat. Of the lead absorbed, less lead is deposited when the calcium-phosphorus ratio is high, when the influence of vitamin *D* or phosphorus on lead metabolism is secondary to the correction of the calcium-phosphorus ratio.

Acknowledgements.

I wish to thank Professor Harvey Sutton, Director of the School of Public Health and Tropical Medicine, for permission to carry out this work, and Dr. R. E. Murray for his kindly interest.

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THE SYNDROME OF APPENDICITIS, WITH SPECIAL REFERENCE TO THE ABSENCE OF SIGNS IN THE RIGHT ILIAC FOSSA.[1]

By C. CRAIG, M.D., M.S., F.R.A.C.S.,
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ALTHOUGH acute appendicitis is now a well-known disease, mistakes in diagnosis are still being made. An analysis of a number of cases in which the diagnosis was unduly delayed has shown that most of these mistakes were made in that particular type of lesion in which neither symptoms nor signs pointed to the right iliac fossa as the possible site of disease, and in which, therefore, acute appendicitis had apparently not been considered in the differential diagnosis. To discover roughly the percentage of occurrence of this type of case, the histories of two hundred consecutive cases of acute appendicitis have been analysed. Although this was the initial purpose of this analysis, the general facts in regard to appendicitis which have resulted from the investigation are so interesting that it has been decided to present these as well.

Historical.

The dominating influence in the teaching on appendicitis for the past forty-eight years has undoubtedly been that of J. D. Murphy, and the historical aspect will be considered only in so much as it throws into relief the work of Murphy.

The first person to describe the disease of acute appendicitis, accurately and as a whole, was Fitz. Fitz, however, was mainly a pathologist, and whereas his pathological description is good, his description of the symptoms is not nearly so good. This is his description given in 1886:[1]

The first characteristic symptom of a perforating appendicitis was found to be a sudden, severe, abdominal pain. This occurred in eighty-four per cent. of the cases, and usually in the right iliac fossa, where tenderness could always be found, even when the pain was referred to some other locality. The pain was attributed to the actual perforation or the detachment of fresh adhesions.

Fever was the next characteristic symptom, and occurred in the course of twenty-four hours. Finally came the swelling which made its appearance in the course of three days.

[1] Read at a meeting of the Royal Australasian College of Physicians, Launceston, October, 1942.

Even as late as 1906 very muddled descriptions of the disease were being given; the following is that of Howard Kelly:[2]

The early symptoms may include pain, tenderness, rigidity, muscle spasms, nausea, vomiting, and constitutional disturbances; distension and tumour may also be present. The time at which these symptoms appear, however, is variable, and some of them may never occur at all.

This description is weak; it is particularly weak when it is realized that J. B. Murphy's brilliant description of the symptoms had been given ten years previously. This description is now reproduced:[3]

There has been a great difference of opinion as to the symptoms of appendicitis and the relation of the symptoms to the pathologic condition within. This diversity will continue until our power of differential diagnosis is very much increased. From a train of symptoms and signs in the early stage it is impossible to say just what is the exact pathologic condition. We can say, however, that it is a disease of the appendix in some stage of its development.

The symptoms of appendicitis are (i) a sudden pain in the abdomen; (ii) shortly followed by nausea and, perhaps, vomiting; (iii) local tenderness over the site of the appendix, and most frequently in the right iliac region; (iv) elevation of temperature. These symptoms, occurring in this order, without a previous history of genito-urinary infection, or of a lesion of the gall-tracts, or Pott's disease, indicate with almost uniform regularity appendicitis. They do not indicate that the appendix is gangrenous, or that there is a simple catarrhal appendicitis. They do not indicate whether it has perforated or has not perforated; nor whether the cause is an infection with the staphylococcus, the streptococcus, or the bacillus coli commune, or the presence of a fæcal stone, or of a foreign body. They do not indicate whether it is a stenosis of the appendix or an appendix obliterans, but merely that it is an appendicitis or acute disease of the appendix.

The physical manifestations, the presence or absence of induration, tumefaction, edema of the wall, tympanites, etc., aid in the differentiation of the various pathologic conditions present in the more advanced stage; but all of these are absent or comparatively worthless in the early stage.

In this same paper in the most forcible language Murphy laid stress on the necessity for early operation.

Murphy in later papers again and again described the sequence of symptoms. To the syndrome already described, however, he later added still another factor, "leucocytosis", so that the completed description of the syndrome reads as follows: The symptoms of appendicitis are (i) a constant pain in the abdomen, (ii) shortly followed by nausea and perhaps vomiting, (iii) local tenderness over the site of the appendix, and most frequently in the right iliac region, (v) elevation of temperature, and (v) leucocytosis.

A particular point must now be noted. Many modern text-books quote the "Murphy syndrome" on the subject of appendicitis; but the third symptom of this syndrome is often misquoted, and is given as "local tenderness in the right iliac region". It will be noted that what Murphy actually stated was that the tenderness was over the site of the appendix, which was usually in the right iliac region. It is a great pity that Murphy did not qualify this statement by pointing out that the appendix was sometimes inaccessible to palpation, and that in these cases pronounced local tenderness should not be expected. It is possible that this modern misquotation of Murphy is responsible for many of the mistakes in diagnosis that are still being made.

The analysis that follows will be made with reference to Murphy's original description.

Sequence of Events.

As the syndrome is, in most cases, complete when the patient reaches hospital, and as in many cases operation is performed at once without any further period of observation, it is difficult to be certain about the sequence of events. This applies, however, only to the third event (the tenderness), to the fourth event (the rise in temperature), and to the fifth event (the leucocytosis). If these are already present when the patient reaches hospital, it is impossible to find out at what stage they entered the clinical picture. About the first event (the pain) and the second event (the nausea or vomiting), it is possible to be reasonably accurate; in fact, this investigation has shown that so far as a sequence of events is concerned, the important thing is to discover the relationship of the other symptoms to the onset of pain, which is the dominating symptom. Of the 200 cases, pain was the first symptom in 198. In two cases it was preceded for one or two days by mild diarrhœa. In 198 cases the pain was soon followed by either nausea or vomiting. It may, therefore, be said that what has been revealed by this analysis as regards the onset of the disease coincides exactly with what Murphy stated. In the vast majority of cases the first symptom of onset is pain, which is followed soon after in most cases by nausea and vomiting. This matter can be put to the test in another way, by applying the corollary to Murphy's law, which he stated thus: "These symptoms occur, almost without exception, in the above order; and when that order varies, I always question the diagnosis." The following case is an example:

A girl, aged twelve years, thirty-six hours before her admission to hospital, complained of a shivery feeling. Her mother took her temperature and it was 100° F. She was put to bed. Eighteen hours before her admission she complained of umbilical pain, which waxed and waned and was present during examination. On examination, her temperature was 100·6° F., her pulse rate was 105 per minute, her tongue was furred and her breath was offensive. There was no rigidity of the abdominal wall; but tenderness was present in the right iliac region, although it was not well localized. The urine appeared normal on examination. Had these symptoms started only eighteen hours before her admission to hospital when the pain first occurred, the lesion would undoubtedly have been regarded as mild appendicitis. As it was, the diagnosis was doubted. Nevertheless the abdomen was opened. The appendix was not inflamed, and the Fallopian tubes and ovaries were normal. The pain disappeared after the operation. On the next day the urine was found to contain pus cells and bacteria. The patient was suffering from pyelitis.

Murphy quotes a case similar to the foregoing where the elevation of temperature preceding the onset of pain was due to typhoid fever. Many other cases could be quoted in which, in an illness which simulated acute appendicitis, but in which the symptoms had occurred out of their usual order, operation had shown the appendix to be normal.

The Symptoms Considered Individually.

Pain.

As has already been stated, pain was the symptom of onset in 198 out of the 200 cases, and it remained the dominating symptom throughout the course of all the cases.

An analysis of the types of pain showed that they fell into three great groups. (i) The pain commenced in the mid-line and later moved to the right iliac region. Ninety-seven cases, or 48·5%, were in this group. In two cases the pain started in the epigastric region before moving first to the umbilical area and later to the right iliac region. The time taken for the pain to move from the mid-line to the right side is one of great interest. The shortest time noted was two hours, and the longest thirty hours. (ii) The pain started in the right iliac region and remained there. Sixty-six cases, or 33%, were in this group. It must be pointed out that the number in this group is probably fewer than is apparent, as probably many patients forget the earlier mid-line pain. (iii) The pain commenced in the mid-line, and did not move at all. Thirty-seven cases, or 18·5%, were in this group. These thirty-seven may be again divided into two further groups. In the first group (31 cases), although the pain remained in the mid-line, signs developed later in the right iliac region. In the second group (six cases), no definite localizing signs developed at all. The investigation was originally undertaken to discover the percentage occurrence of this latter group, and it will be discussed later.

A special note must be made in regard to pain in the back in acute appendicitis. The appendix is an organ which lies normally close to the posterior wall of the abdomen. It is true to a certain extent that when it is inflamed it extends itself towards the anterior wall. Nevertheless, it is usually found to lie closer to the

posterior wall, and the posterior wall can usually be seen to be inflamed. In spite of this, pain in the back is a rarity in acute appendicitis. In the series under consideration, pain in the loin and back was noted on two occasions only, and was associated with pain felt in the right iliac region in front. In both these cases the appendix lay in the right paracolic gutter pointing towards the loin. It is to be concluded either that the posterior portion of the peritoneum and the subjacent tissues are insensitive to pain, or else that pain arising in that region is felt anteriorly.

Vomiting.

Vomiting or nausea was present in all cases except two. It is worth noting, therefore, that although vomiting or nausea is usually present, neither is absolutely necessary for a diagnosis of acute appendicitis. In none of the 200 cases was the vomiting so severe as to suggest an appendicitis of the obstructive type.

Localizing Signs in the Right Iliac Fossa.

The presence of localizing signs in the right iliac fossa is a very important point, as in the absence of such signs mistakes in diagnosis are apt to occur. In this series there were localizing signs in all cases except seven; it is significant that the pain in six out of these seven cases had remained in the mid-line, and had not moved. In each case vague, indefinite tenderness was present over the lower part of the abdomen. In none of the six cases could tenderness be elicited by palpation *per rectum*. Further reference to this matter will be made later.

Elevation of Temperature.

Elevation of temperature was present on admission to hospital in 126 cases (63%). The highest recorded temperature was 102·1° F.

Pulse Rate.

The pulse rate was raised in 125 cases, or 60·25%. The pulse rate was never raised unless the temperature was also raised. The highest pulse rate recorded was 110 per minute.

"Abdominal" Breath.

Many surgeons place great reliance on "abdominal" breath as a sign. It was obvious from the histories that special attention had been paid to this point. In only 107 cases, or 53·5%, was the breath described as being "abdominal".

"Dirty" Tongue.

The tongue was regarded as being "dirty" in 120 cases, or 60%.

Duration of Symptoms on Admission to Hospital.

It was disquieting to find that in this series of 200 cases, 90 patients had had symptoms for more than thirty-six hours by the time they were admitted to hospital, and another 36 had had symptoms for more than twenty-four hours.

Previous Attacks.

Sixty-five patients, or 30·75%, had had previous attacks. It was thought that there might be some relationship between the type of pain and the occurrence of a previous attack. There turned out to be no clear relationship. Of the 97 patients whose pain started in the mid-line and then moved to the right side, 21 had had previous attacks. Of the 66 whose pain started in the right iliac fossa, 34 had had previous attacks. Of the 37 whose pain remained in the mid-line, 10 had had previous attacks.

Mortality Rate.

One patient died, the mortality rate being 0·5%.

The Special Type of Case.

The main purpose of this investigation was to discover roughly the percentage of cases in which there were no signs pointing to the right iliac region. The following is a typical case:

A man, aged twenty-four years, had a heavy supper at 10 p.m. At 12 midnight he awoke with pain in the epigastrium. He took this to be acute indigestion. Soon afterwards he vomited copiously. The pain was not relieved, however, and in two hours' time it was noticeably lower, and in the umbilical region. He vomited twice again. The pain still continued. He went to work at 7.30 a.m., but had to cease work at 10 a.m. He was sure that the pain was not that of appendicitis, as it was not in the right side. He vomited again. A doctor was called in at 12 noon. He could find no localized tenderness or rigidity, although vague tenderness was present over the whole of the lower part of the abdomen. The doctor said he would call later, and returned at 6 p.m. The pain was still umbilical, and no localized tenderness or rigidity was present. The patient was then sent to hospital. No localized signs were ever found by palpation, either of the abdomen or *per rectum*. The tongue was furred. The breath was not "abdominal". The temperature was 100° F., and the pulse rate was 90 per minute. Operation was performed at 10 p.m., and an acutely inflamed appendix was found, which was lying just over the brim of the pelvis.

Of the 200 cases which were analysed, six, or 3%, were of the foregoing type. Unfortunately, the situation of the appendix was stated in only three of these cases. In two it lay over the brim of the pelvis, but in one it was in the right iliac fossa. In regard to the above-mentioned type of case, it cannot be too strongly emphasized that pain in the abdomen is the outstanding symptom, and that action can be taken on the presence of pain alone. In the early stages there may be no other symptom or sign at all; there may be no vomiting, no rise in the temperature or in the pulse rate, no "abdominal" breath, and no dirty tongue. If pelvic appendicitis is suspected, it must be remembered that tenderness *per rectum* and symptoms of irritation of the bowel or bladder are late signs, and should never be waited for. Acute appendicitis is supposed to be a safe disease only if operation is undertaken within twelve to fifteen hours of the onset. It is important to remember, therefore, that this analysis has shown that in the early stages the main symptom is pain in the mid-line of the abdomen. In fact, if those cases in which the pain later moves to the right side are added to those in which the pain never moves, the proportion of early mid-line pain is 67%. It is during this stage of the illness that the patients should be admitted to hospital. It is common in this hospital to have patients admitted who have been observed in their own homes for twenty-four hours or more, in the hope that definite localizing symptoms may occur. In cases in which mid-line pain is present, an excellent aphorism to bear in mind would be the following: "Acute pain in the mid-line of the abdomen, particularly when occurring in a young person, is due to acute appendicitis, unless it can be proved otherwise."

Acknowledgement.

I am very grateful to the Secretary and Librarian of the Royal Australasian College of Surgeons for researches into early papers by Murphy.

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MYCOTIC EAR INFECTIONS AT AN ADVANCED ALLIED BASE.

By ERIC L. DAVIS,
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MYCOTIC or fungous infection of the external auditory canal is a fairly prevalent condition in the services in tropical belts. In this series 22 patients were examined and treated during the months of June and July, 1943.

For the benefit of those of the medical profession who have not access to "Australian Military Forces D.G.M.S. Technical Instructions", I have reproduced the descriptive instruction issued by the Director-General of Medical Services, Land Headquarters.

The following three stages may be described.

In stage I the ear feels sore and tender to the touch or when pulled; chewing may be painful. On examination, after the external auditory canal has been cleansed, no definite abnormality is visible. Before the canal is cleaned it often contains soft semi-fluid wax and debris of flecks of a white foamy substance. To this I may add that this stage of presenting symptoms is present for three or four days, and was not seen in this series of cases. Owing to conditions of service the soldier usually presents himself in stage II or stage III.

In stage II the external canal is red and inflamed; the wall is not swollen. The ear is tender and chewing is painful. From my own observation, this was the most commonly presented state. The canal is coated and sometimes completely blocked with soft, moist, sebaceous-like detritus, often with a greenish tinge (due, as will be pointed out later, to a secondary infection with *Bacillus pyocyaneus*).

After the ear has been syringed, the canal wall is found to be an angry red, with excoriation of the epithelial lining in most cases. The drum is not commonly affected, though in a few cases injection was noted. Stage II was seen in sixteen cases of the series.

In stage III the canal is swollen, often obliterated and very painful. The complaint is that the pain is worse at night. Sometimes when the swelling subsides an *otitis media*, of which there is no previous history, is revealed. Stage III was seen in six cases of this present series. In two severe cases œdema of the periaural tissues was present. All patients had a moderate pyrexia, the temperature ranging from 99° to 100° F.

In twenty cases the infection was unilateral, and in two it was bilateral.

Ætiological Factors.

1. One commonly accepted ætiological factor is bathing in an infected pool. This did not apply, as there were no facilities for communal bathing.

2. An attempt was made to correlate the ear infections with coexistent mycotic skin disease. In ten cases coexistent *tinea cruris*, *tinea circinata* or *tinea interdigitalis* was revealed—crural tinea in six cases, circinate tinea in two cases, interdigital tinea in two cases. It is possible that transmission of the infection to the ear may have occurred by towels. The interdigital infection is discounted, as it is such a prevalent infection in all troops.

3. A fungus may be the cause. In the first six cases facilities for pathological examination were not available. Specimens were submitted in the remaining sixteen; of these, in eleven the presence of mycelium and spores was revealed. The pathologist, Squadron-Leader Cumming, considers that the fungus is a trichophyton.

The material submitted for examination consisted of the waxy detritus and skin flakes syringed from the canals. As a point of practical interest, the pathologist reported that the mycelium was often more readily picked up in the waxy material. Half the specimens submitted had a greenish colour due to the presence of *Bacterium pyocyaneus*—no doubt a secondary invader.

Treatment.

In the initial stages, in all cases an ear toilet was carried out; the ear was syringed and swabbed with spirit to dry out the canal. Glycerin and ichthyol (10%) tampons were inserted. Swabbing out with spirit and tamponage were repeated daily until the acute stage subsided. This took, on the average, three or four days. Subsequently, the canals were swabbed with spirit once a day and painted with pigment—carbol fuchsin (Castellani). Healing occurred within four or five days of the commencement of this specific therapy. In three cases, after treatment with carbol fuchsin, the canals were still "moist". Sulphathiazol powder was insufflated and the condition rapidly dried up.

The six patients in the stage III category were admitted to hospital at the dressing station, and apart from routine treatment, analgesics were given and heat was constantly applied by hot-water bags to the ear. Three days' treatment was sufficient to settle this acute stage, and the patients were discharged from hospital, to report for daily treatment.

The average duration of treatment was seven days for cure; the longest period was fifteen days, the shortest five days.

Summary.

1. Twenty-two cases of mycotic external otitis are reported. These occurred in the months of June and July among a force serving at a tropical station.

2. With the exception of the six patients admitted to hospital, all personnel under treatment were on full duties.

3. The condition is not serious, but has a "nuisance value", involving loss of time each day.

4. In eleven of the specimens submitted for pathological examination, a fine mycelium was identified (trichophyton).

5. Treatment is curative.

Acknowledgements.

My thanks are due to Lieutenant-Colonel P. W. Hopkins, S.M.O. Force, for permission to conduct this investigation, and to Squadron-Leader Cumming, pathologist at the mobile receiving station, who undertook the isolation of the mycelium.

Permission has been kindly granted by Major-General S. R. Burston, Director-General of Medical Services, to publish this report.

A METHOD OF TREATMENT OF "TROPICAL EAR".

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"TROPICAL EAR" is also known by various terms in different parts of the world—namely, "Singapore ear", "Panama ear", "surfer's ear", "hot weather ear"—and technically, as "*otitis externa diffusa*" and also "desquamative external otitis".

Many methods of treatment have been recommended, the number of which suggests their ineffectiveness. The treatment suggested here is one that has been tested in nearly 200 cases, among civilians and military personnel, and the average length of time required to effect a cure was twelve days. In some cases, the lesion had been present for many months, in several for over six months; in one case a woman (a civilian) had been having daily treatment for eight months. Many of the patients among military personnel had already had the standard treatment over a long period, with but partial relief.

The method of treatment is exceedingly simple. In the stage of œdema of the external auditory meatus, which is the stage at which patients from northern areas are most frequently seen at this unit, reduction of the swelling of the meatus is first of all necessary to permit the use of ear drops and to control the pain. This reduction is obtained by tight packing of the meatus with half-inch ribbon gauze. By "packing" is not meant the placing of a wick in the canal, but the hard packing of the whole canal under direct vision. This can be, and generally is, excruciatingly painful, and one-quarter or one-third of a grain of morphine should be given hypodermically one hour before the operation. In a few cases light ethyl chloride anæsthesia has been found necessary to permit thorough packing of the whole meatus.

The medicament used on the gauze for packing is not of importance, except that watery solutions and glycerin are contraindicated. It has been my practice to use for this purpose the ear drops, the prescription for which is given below, to avoid multiplicity of medicaments. I have not found the time-honoured glycerin with ichthammol (10%) any more effective in reducing the pain than plain liquid paraffin; it is the pressure which is important. The packing is left *in situ* for forty-eight hours, and is

moistened by applications of the ear drops twice a day to prevent its hardening and resultant possible irritation of the meatus. When the packing is removed, the lumen of the canal is found to be wide open, permitting the use of ear drops.

In cases in which œdema is slight, the meatus is often found to contain a mixture of epithelial debris, cerumen, fungus and pus. This must be removed before the drops can be used. Dry removal by swabs and forceps is tedious to the medical officer and painful to the patient, and often causes bleeding from the meatus, and, moreover, it cannot be done efficiently by nurse or orderly. Though the use of the watery solutions is contraindicated in the treatment of the condition, the syringing of the canal with water containing sodium bicarbonate is justifiable in two stages of treatment—first, at the beginning, to remove accumulated debris, and secondly, at the end of the treatment, to remove sediment from the ear drops, which may impair hearing. After the syringing, care must be taken to allow the water to drain out of the meatus, which is then dried with *Spiritus Vini Rectificatus*.

The medicament used is 5% mercuric ammonium chloride (B.P.) in liquid paraffin. The mercuric ammonium chloride is insoluble in paraffin and settles out as a white sediment. Consequently the bottle must be well shaken before use. The use of the unofficial preparation, *Liquor Paraffini Levis*, also known as "spray paraffin", the viscosity of which is less than that of liquid paraffin, permits easier passage of the drops to the depths of meatus. This type of paraffin, however, is unobtainable at the present time. The drops are used three times a day, and it must be certain that they reach the tympanic membrane itself so that all parts of the meatus are covered. No cotton wool packs or plugs should be allowed in the ear. If the ear is turned downwards after treatment and the excess drops are allowed to run into a towel, the soiling of the clothes is prevented. Sufficient will remain as a film in the meatus. Cotton wool in the meatus or concha sticks to the skin and produces or aggravates excoriations.

Excoriations, when present (and in about 70% of long-standing cases excoriations are present in the outer ear and sometimes in the face, neck and mastoid areas), are treated with *Unguentum Hydrargyri Ammoniati* (B.P.). This preparation, however, being soft, tends to be wiped off easily, and the following prescription, being more "tacky", is more satisfactory:

℞

Hydrargyri Ammoniati	24 grains
Zinci Oxidi	1 drachm
Amyli	1 drachm
Paraffini Liquidi	1 drachm
Adipis Lanæ Hydrosi	1 ounce

This ointment is applied to the excoriated areas twice a day.

For the glandular swelling and pain associated with the condition, *Unguentum Iodi Decoloratum* (A.P.F.) rubbed in twice a day apparently gives relief, especially if heat in the form of a hot-water bag or bran bag is also used. The foregoing ointment appears to be identical with, or similar to, the proprietary preparation, "Iodex", and as the manufacturers of this are generous in donations of the ointment in pound jars to medical officers, this preparation has been almost exclusively used in this unit with satisfactory results.

The majority of patients suffering from "tropical ear", especially when seen in the first and second stages—that is, before pronounced œdema of the meatus has occurred—respond satisfactorily when treated as out-patients without being taken off duty, if such arrangements are possible. In the third stage, when the œdema is sufficient to necessitate the use of morphine or ethyl chloride anæsthesia before packing of the meatus, the patients are kept in hospital till the day after packing has been removed, and then discharged to their unit if this is a local one, where treatment is carried out at the regimental aid post or by the patient himself; he is instructed to report again in ten days' time. It has been my experience that most of the pain and much of the discharge disappear after two days' use of the drops and ointment.

Summary.

A form of treatment of desquamative external otitis by the use of ointment and ear drops containing mercuric ammonium chloride is suggested.

Acknowledgements.

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Reports of Cases.

TWO COMPLICATIONS OF PROPHYLACTIC SULPHONAMIDE THERAPY.

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AND

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Two cases of complications of sulphonamide therapy are reported. They give a reminder of the potential danger of chemotherapy and a warning against its indiscriminate use. In both cases a fatal termination might have resulted from a non-lethal complaint. The small dosage which produced these complications is to be noted.

Case I: Sulphapyridine—Agranulocytosis.

A soldier, aged forty-three years, suffered second and third degree burns about the arms, face, neck and sides of the body at 8.30 a.m. one day, when a two-gallon tin of methylated spirits exploded. He was attended by a medical officer, and then, after a long journey with nothing to eat and little to drink all day, was admitted to hospital at 9 p.m.

After anti-shock treatment, under morphine amnesia the burnt areas were thoroughly cleansed with soap and water and saline solution, sprayed with sulphanilamide powder and then covered with *tulle gras* and saline compresses. It was estimated that 16% of the body was burnt.

The hæmatocrit readings and hæmoglobin value seemed out of proportion to the area and severity of the burn. Fluids given freely by mouth and 1,500 cubic centimetres of serum administered intravenously (over the first thirty-six hours) did not dramatically restore the hæmoglobin value and hæmatocrit reading to normal.

Thirty-six hours later the patient was very cyanosed with profuse skin action. His temperature was 103° F. As a developing pneumonia was suspected, four grammes of sulphapyridine were given. He remained nauseated and vomiting was present. Sulphapyridine therapy was discontinued after he had received only eleven grammes in thirty-six hours. The burnt areas were being moistened with saline solution and sprayed once a day with sulphanilamide powder.

Ten days later the burnt areas had almost epithelialized, and it was obvious that the patient would require no skin grafting. However, he was lethargic, mentally confused and sweating profusely, and had subconjunctival hæmorrhages. He had no cough; but dulness and bronchial breath sounds were noted at the lower lobes of both lungs. Numerous furuncles developed on his body (material from them yielded a pure culture of *Staphylococcus aureus*). The white blood corpuscles numbered 3,300 per cubic millimetre (no differential count was made) and the hæmoglobin value was 72%.

The next day he was very ill indeed; his temperature was 104° F. and his pulse rate 120 per minute. His back was covered with hæmorrhagic pustules and his mouth was dirty, although his throat was clear. The number of white blood corpuscles had fallen to 1,800 per cubic millimetre and showed a typical picture of agranulocytosis. Two cubic centimetres of yellow bone marrow were given intramuscularly and a further two cubic centimetres were to be administered if there was no alteration in the white blood cell count in the next twenty-four hours.

Within twenty-four hours the number of white blood cells had risen to 4,800 per cubic millimetre, and on succeeding days the white blood cell estimations were as indicated in Table I.

He quickly recovered from the skin infection and the agranulocytosis, but developed embolic infarcts in the lungs from a thrombosis of his iliac veins. Subsequent recovery from the illness was slow.

Comment.

This man had recovered from his burns within three weeks, but remained at death's door for a considerable time because of the toxic effects of sulphonamide therapy.

Prior to the advent of nucleotide therapy in 1932, which according to Jackson, Parker and Taylor[3] reduced the mortality rate from 75% to 26%, the prognosis in agranulocytosis was grave. However, Plum in 1938 stated that the mortality rate was still between 70% and 90%, that the presence of skin lesions, mental confusion and obesity were bad prognostic signs (the mortality rate being 100% where any of these existed), and that the outlook for the elderly was poor. This patient had all these bad prognostic signs, but recovered in spite of the development of embolic infarcts in the lungs.

With "Pentnucleotide" the rise in the number of white cells is relatively slow; but Marberg and Wiles[3] in 1937 reported success with yellow bone marrow extract, which gives a rapid and dramatic leucocytosis.

In 1940, Drevermann and Gardner[4] described a method of preparation of an extract of yellow bone marrow in Australia. It was this local product that was successfully used in this case.

Agranulocytosis has been attributed to a constitutional factor or susceptibility, and also to a sensitivity acquired from previous ingestion of the sulphonamide drugs.[1][6] This patient had never previously taken any drugs of the sulphonamide group or amidopyrine. In this case the oral dose was a small one—eleven grammes in thirty-six hours. The smallest dose quoted in medical literature as having produced agranulocytosis (Spain[7]) was nine grammes—4·5 grammes of sulphapyridine and 4·5 grammes of sulphanilamide. However, the patient reported here was also absorbing the drug from a large area of his body and exhibited the toxic symptoms of cyanosis, mental confusion and anoxæmia before the tablets were administered orally. In this connexion the report of Gordon and Bowers[5] of a case of burns, in which the sulphanilamide in the blood reached the level of 29 milligrammes *per centum* and then 59 milligrammes *per centum* on the second day after its local application only to a burn, is of interest.

Conclusions.

1. It seems questionable whether, apart from actual infection, sulphonamide should be used repeatedly as a prophylactic measure on large surfaces recently made raw. Absorption of the drug from a recently burnt surface is easy and rapid, as opposed to that from established granulating wounds, of which we have similarly treated large numbers with no such ill effects.

2. If any sulphonamide is used locally on large raw surfaces, such as extensive burns, repeated estimations of the amount of drug in the blood should be made. Complications such as agranulocytosis should be looked for, and repeated differential white cell counts should be made in suspect cases.

3. Speedy treatment of the complication is indicated. Extract of yellow bone marrow is a most effective treatment.

4. The personal factor or idiosyncrasy to the drug seems most important in determining the development of agranulocytosis, for many patients have been given as much of the drug as the dosage in the present case, and even more, on similar large surface lesions, without manifesting any toxic effects.

Case II: Sulphathiazole—Renal Complications.

A soldier was admitted to hospital with the residuum of an old osteomyelitis—a gutter in the lower part of the tibia covered and surrounded by an unstable scar, which had repeatedly broken down in the past year. On April 12, 1943, he was submitted to operation, the procedures undertaken being excision of epithelium lining the bone cavity, rotation of lateral (skin and soft tissue) flaps to fill the bony depression, and the application of a split skin graft to the new skin defect. In view of the old bone sepsis, after operation sulphathiazole was administered (five tablets twice a day) as a prophylactic measure, beginning on April 13. The patient immediately became nauseated (there was no record of fluid intake that day).

The subsequent course of the illness was as follows. On April 14 nausea and vomiting continued, and the patient had abdominal pain. Sulphathiazole treatment was discontinued in the evening—that is, after he had received only 7·5 grammes of the drug. On April 15 pain was present in the back and suprapubic regions. Hæmaturia was noted in an evening specimen of urine. He was given sodium bicarbonate solution to drink, followed by free administration of fluids and saline solution *per rectum*. The intake and output of fluids were recorded. Plastines were applied to the loins. On April 16 the patient was still very ill and vomiting. Only 3·5 ounces of blood-stained urine were passed during the night; the urine contained a large number of erythrocytes, a number of leucocytes and some swollen epithelial cells. Occasional sulphathiazole crystals were present. The urinary output for the day was very small and the fluid balance was negative. The intravenous administration of one litre of saline solution was followed by rapid improvement; sixteen ounces of clear urine were passed, and there was no further pain. On April 17 the patient was taking fluids well and passing urine satisfactorily

Comment.

The following signs and symptoms of renal damage from sulphathiazole therapy were apparent: hæmaturia, oliguria, sulphathiazole crystals in the urine, backache and tenderness over the kidneys. It is said to be rare for all these to exist at the same time.

Though sulphathiazole was introduced in 1939, until 1942 only 29 instances had appeared in the literature in which sulphathiazole produced apparent renal damage. That a high mortality rate is present is indicated by the fact that in five of these cases death resulted.

The drug is rapidly absorbed from the intestinal tract and is rapidly excreted by the kidneys if renal function is adequate. This high rate of elimination is apparently responsible for precipitation of crystals in the urinary tract. A specific hypersensitivity appears to develop, as with other sulphonamides, as suggested by the fact that com-

TABLE I.

	Date.							
	9/2/43.[1]	10/2/43.	11/2/43.	12/2/43.	13/2/43.	14/2/43.	18/2/43.	24/2/43.
Total white blood cells per cubic millimetre	1,900	4,800	7,500	11,000	16,000	17,000	21,000	16,000
Differential white blood cell counts—								
Neutrophile polymorphonuclear cells ..	1%	12%	53%					80%
Eosinophile cells	2%		2%					
Basophile cells	3%	1%						
Old metamyelocyte	0%	16%	25%					5%
Young metamyelocyte		15%	2%					
Monocytes	46%	29%	13%					3%
Lymphocytes	48%	27%	5%					12%

[1] Two cubic centimetres of yellow bone marrow were given on this date.

plications are more frequent after several courses of the drug, or when administration of the drug is long maintained.

In reported cases the fatal outcome does not appear to be dependent on the quantity of sulphathiazole administered or on the level of sulphathiazole in the blood. In one case reported eight grammes were given during two days, and the patient recovered after ureteral catheterization and lavage. But there appears to be no case in medical literature in which such a small dose as was given in the case reported here—only 7·5 grammes in all—caused serious symptoms. Twelve months previously the patient had taken eight sulphathiazole tablets per day for several weeks continuously without ill effect, and he had had no sensitizing dose since.

Conclusions.

1. Inquiry should always be made regarding previous sulphonamide administration. It appears that any sulphonamide may sensitize a person to the other drugs of the group.

2. Adequate fluid intake must be maintained during therapy; two litres of urine are required to be passed per day to prevent crystal formation (alkalinity of the urine also reduces crystal formation).

3. Any suppression of urine should be noted and the urine examined for blood cells or sulphathiazole crystals.

4. A watch should be kept for toxic symptoms or developing hypersensitivity. A fever, chill or pyrexia unaccounted for by infection may be due to the drug itself. Many mistakes have occurred in these circumstances by increase of the dosage on the supposition that the infection is not being controlled. Lyons and Balberor[3] found that 36% of the patients developed a drug fever following the administration of sulphathiazole, this fact indicating that the drug is more dangerous than usually considered. It should be used only when specifically indicated, and its administration should not be continued longer than necessary.

Acknowledgements.

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Case II.

(1) T. Winsor and G. E. Burch: "Renal Complications following Sulfathiazole Therapy", *The Journal of the American Medical Association*, Volume CXVIII, April 18, 1942, page 1346.
(2) R. H. Lyons and H. Balberor: "Febrile Reactions Accompanying the Readministration of Sulphathiazole", *The Journal of the American Medical Association*, Volume CXVIII, March 21, 1942, page 955.
(3) C. F. Garvin: "Renal Complications due to Sulphathiazole", *The Journal of the American Medical Association*, Volume CXVI, January 25, 1941, page 300.
(4) E. N. Allott: "Sulphathiazole in Meningococcal Infections", *British Medical Journal*, Volume I, June 22, 1940, page 1033.
(5) H. F. Flippin, J. G. Reinhold and L. Schwartz: "Sulphapyridine and Sulphathiazole Therapy in Pneumococcic Pneumonia", *The Journal of the American Medical Association*, Volume CXVI, February 22, 1941, page 683.

POST-MORTEM DELIVERY OF TWINS BY FORCEPS AND MANUAL MANIPULATION.

By ROBERT M. ALLPORT,
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IN view of the report by Dr. T. Dixon Hughes in THE MEDICAL JOURNAL OF AUSTRALIA of October 2, 1943, concerning the rarity of post-mortem delivery, *per vias naturales*, of a living child, I thought that the following case might be of interest.

Clinical Record.

Mrs. M.B.H., aged twenty-six years, a *primipara*, was admitted to a private hospital at Gulgong early in the morning of February 15, 1932. The diagnosis was hydramnios, twin pregnancy and preeclamptic state. Her systolic blood pressure was 180 millimetres of mercury and her diastolic blood pressure 100. Her urine contained 1/3 albumin, and her abdomen was enormous. Apparently her pregnancy had proceeded in a fairly normal manner, except that she had noticed that her abdomen had increased in size very rapidly during about the last three weeks before her admission to hospital.

Labour had started, and about 7.30 p.m., when she was well in the second stage of labour, the membranes ruptured and she was prepared for anæsthesia. Before this could be properly begun, the patient collapsed, and despite all efforts, died. Unfortunately oxygen was not available. Death probably was due to the heart's being unable to stand the shock of sudden diminution of intraabdominal tension, after rupture of the membranes, as the flow of liquor was enormous, and was difficult to control. Strenuous efforts were made at resuscitation for several minutes—how many I am unable to say, as no record of time was taken in the rush; but there was no sign of recovery after at least six or seven minutes, and thought was then given to the fate of the undelivered infants. An attempt was then made to save them, and with the greatest disregard for asepsis, as in Dr. Dixon Hughes's case, forceps were applied midway up the pelvis to the presenting part of the first infant, which was the head. This child was delivered after a little effort. The second child was found to be presenting by the breech. This child was delivered by the insertion of a hand in the uterus, which grasped the buttocks and brought them down, and the delivery was finished in the usual manner.

Both infants were rather pallid and limp, but had discernible heart beats. After a few minutes' artificial respiration and sucking away of mucus, respiration started spontaneously, and from then on they progressed rapidly. The children respectively weighed six pounds and five and a half pounds, and to the best of my belief they are alive and well today.

Reviews.

WAR AIMS.

"WAR AIMS OF A PLAIN AUSTRALIAN" by Dr. C. E. W. Bean is a book every man and woman should read and have within their hands' reach when the last bomb of the second world war has been released on its mission of destruction and retribution.[1] It could be used now with advantage as a handbook for those whose duty and privilege it is to plan for the peace that is to come.

The reasons for the failure to win the peace after the last war, and for the "financial depression" and its consequent demoralizing mass unemployment, are shown by the author with unmistakeable clarity. And after the present war, "are we again merely to lapse into peace with one big sigh, and lie back and let our old masters—the old ideas, the old standards and ideals, and the old men—make the same old mess of the opportunity which so much sacrifice will have again won?" The author does not think so, "for the eyes of young Australians, and of most old ones, are, thank God! still fixed on the vision of Australia as they want to see her . . . and after having seen the achievement of many things that the old minds of mankind declared impracticable, they are not going to accept the judgement of anyone that these aims are impossible".

[1] "War Aims of a Plain Australian", by C. E. W. Bean; 1943. Sydney and London: Angus and Robertson Limited. 7" × 4½", pp. 183. Price: 4s. 6d.

The future of Australia is linked with that of other nations, helping and being helped by them, for there can be no lasting progress without truthful cooperation. In reference to our internal affairs, concrete proposals are advanced for a programme covering a national minimum of real income in food, clothing, housing, health, education and recreation, a population and immigration policy, and a decentralization programme including town and regional planning. The author's views on those subjects are described with force and imagination and with a full realization that the planning for peace should be as sustained as that for the war itself, and calls for just as much cooperation. The fallacy that immigration would result in unemployment is exposed again, and our present educational system is constructively criticized.

While some readers will not agree with all the author has written, they cannot but be impressed with his choice of words and the gripping manner in which he presents his views. Dr. Bean's book should do much to influence people "to strive shoulder to shoulder with mates all over the world in the generous effort to fill the all-too-short limits of each human life with the utmost measure of usefulness and happiness, to hear our nation's name honoured whenever men speak of mankind's fight towards truth as the foundation of all progress".

SULPHONAMIDE THERAPY.

WE should be grateful to Dr. Wesley W. Spink for undertaking such an extensive revision of the text in the second edition of his book, "Sulfanilamide and Related Compounds in General Practice".[1] The first edition was reviewed in these columns in our issue of April 25, 1942, since when substantial progress has been made in the chemical and clinical investigation of these valuable therapeutic agents.

In the short time that has passed a rich experience has been gained by medical personnel with the fighting forces in the prophylactic and curative uses of these drugs in bacterial diseases and infected wounds. In addition widespread clinical research by competent observers in the larger hospitals has helped to establish the reputation of some of the newer compounds, and to make a clearer evaluation of their uses and possible abuses in actual medical practice. Doubtless it is due to this wider experience and rapid increase in the knowledge of sulphonamide therapy that Dr. Wesley Spink has found it necessary to make such a radical revision of the subject matter and to enlarge the proportions of his original work.

In the more robust second edition we find new sections on the chemical properties, therapeutic uses and toxic propensities of sulphathiazole, sulphaguanidine and sulphadiazine. The last-mentioned is given priority over all its related compounds for selection in the treatment of streptococcal, meningococcal and pneumococcal infections by reason of its lower toxicity and high bacterial efficiency.

One of the earlier chapters provides an interesting discussion on different theories which have been advanced to elucidate the mode of action of the sulphonamide upon the bacterial cell, and the possible association of its chemical constitution with the bacteriostatic process. Then follow laboratory methods for the quantitative estimation of the drug, which is an essential procedure if the clinician wishes to maintain adequate concentrations in the blood, urine or cerebro-spinal fluid.

In later chapters the author deals at some length with such modern topics as the treatment of intestinal infections, the local application of the sulphonamides in the surgical management of open wounds, compound fractures and the various types of burn, whether they be applied in the form of powder, crystals, in solution, in suspension or as an ointment.

Towards the end of the book a long chapter completely covers the toxic manifestations which may be encountered in patients saturated with these potentially dangerous drugs. And the point is stressed more than once, that the physician who wishes to prescribe them must be well acquainted with the toxic reactions they elicit, so that precautionary measures may be taken in good time to prevent more serious complications.

The final pages are taken up with an index, and a long bibliography containing some eight hundred references to recent literature on the subject.

A copy of this informative publication should be in the possession of every medical practitioner, and might well find a useful place in all medical libraries. More than a superficial knowledge is necessary for the intelligent application of these remarkable drugs in modern medical and surgical practice; and it would be difficult to procure a more comprehensive survey of the position than is set forth in this well-written handbook.

REGIONAL ANATOMY.

MOST students of anatomy at one period or another experience a feeling of helplessness in face of the great bulk of their systematic text-books and dissecting manuals. Professor T. B. Johnston's "Synopsis of Regional Anatomy"[1] should help to dispel this feeling, for it contains within its 400 small octavo pages, not only the dissecting-room or "soft-parts" anatomy, but also the essentials of "bones and joints", embryology, central nervous system and special senses, together with brief notes on function. But the book is for revision, and must be used, as directed by the author, only after the part has been dissected under the guidance of dissecting manuals; and the student is advised to read the introductory sections in their systematic text-book.

The appearance of this fifth edition within a period of twenty-two years speaks highly for this book on anatomy.

FOOD ALLERGY.

PROVOCATIVE and stimulating reading is provided by Dr. Arthur F. Coca in his book on food allergy (familial nonreaginic).[2] This is the term he introduces to cover that large group of allergic diseases (migraine, urticaria, gastro-intestinal allergy, neuralgias, and a number of more or less serious conditions hitherto unrecognized as allergic) which are characterized by the absence of allergic antibodies ("reagins"). Dr. Coca's thesis is that exhibition of the appropriate allergen practically always causes acceleration of the pulse, and that the production of this tachycardia provides a test of diagnostic significance. Trial diets are provided by which skin allergen may be recognized, and methods are suggested by means of which relief of symptoms may be secured.

Dr. Coca's book is clear in thought and expression, a rather unique feature in the literature on allergy. It is worthy of consideration by those interested in this engrossing subject.

PSYCHOLOGICAL MEDICINE.

ALTHOUGH Curran and Guttmann's book bears the subtitle of "A Short Introduction to Psychiatry", readers will quickly recognize that it provides ample common-sense information and guidance regarding the common mental syndromes, which are classified on broad lines.[3] For example, paranoia is dealt with in the chapter on schizophrenia and affective reaction types cover the manic depressive syndrome and anxiety and obsessional states. With the growing number of hospitals for the treatment of mental patients on a voluntary basis the older distinctions between "insane" and "psychoneurotic" have become less important. After all the main thing is not to know what precise label to apply, but to try to understand how the patient has come to react in a particular way. The appendix on wartime psychiatry is, of course, very timely, and it contains a useful section on the psychiatric aspects of head injury. Some twenty illustrations of pathological features, clinical types and schizophrenic drawings enhance the value of an interesting work, which may confidently be recommended to students and practitioners.

[1] "Sulfanilamide and Related Compounds in General Practice", by Wesley W. Spink, M.D., F.A.C.P.; Second Edition; 1942. Chicago: The Year Book Publishers, Incorporated. 8¼" × 5¾", pp. 374, with illustrations. Price: $3.00.

[1] "A Synopsis of Regional Anatomy", by T. B. Johnston, M.D.; Fifth Edition; 1943. London: J. and A. Churchill Limited. 8¼" × 5¼", pp. 432, with 17 illustrations. Price: 16s.

[2] "Familial Nonreaginic Food-Allergy", by Arthur F. Coca, M.D.; 1943. Springfield: Charles C. Thomas. 8¼" × 5¾", pp. 167. Price: $3.00.

[3] "Psychological Medicine: A Short Introduction to Psychiatry, with an Appendix, War-Time Psychiatry", by Desmond Curran, M.B., F.R.C.P., D.P.M., and Eric Guttmann, M.D., L.R.C.P. (Edinburgh), with a Foreword by J. J. Conybeare, D.M., F.R.C.P.; 1943. Edinburgh: E. and S. Livingstone. 8¼" × 5¾", pp. 196, with 21 illustrations. Price: 10s. 6d. net, postage 6d.

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HOUSING IN AUSTRALIA AS A POST-WAR PROBLEM.

THE Australian public has recently been told by the daily newspapers that the Commonwealth Housing Commission intends to begin work immediately on details of a post-war housing scheme. The Federal Government realizes, it has also been stated, that something practical has to be done at once to lay the foundations of a housing scheme. This news should be of interest to medical practitioners, who, as we are never tired of stating in this journal, know that the provision of adequate housing is one of the essential means by which the future health and general well-being of the Australian people can be assured. In a discussion a week or two ago on the social background of the future of medicine we declared that the medical profession in this country knows that sociological medicine is an inseparable part of medicine as a whole; and also that social security will not be possible unless all the objects of sociological medicine are attained. The problem of housing is not simple. It will not be solved just by the erection of a sufficient number of buildings, consisting of boxes commonly known as rooms, where men and women can be protected from inclemencies of the weather, where they can sleep at night, and where they can, generally speaking, lead a more or less shut-in or open-air existence according to the fancy, the greed or the decent understanding of the speculator who puts the boxes together into what is known as a house. He who would evolve a housing scheme for a present-day community must consider many factors—the place where houses are to be erected and its suitability from the subsoil drainage point of view as well as from that of its general surroundings; the size of the allotment on which the house is to be built; the size of the dwelling, so that its several rooms shall be large enough to meet the health requirements of the dwellers; the availability of water supply, sewerage and lighting facilities; the provision of such gadgets, aids to housekeeping and other labour-saving devices as will be used and appreciated by the people; the availability of communal amenities such as park lands, playgrounds for children, and so on; distances from centres where work is done and the provision of transport for workers; the existence within reasonable distance, in the case of an area built on for the first time, of baby health centres, hospitals, schools, churches, libraries *et cetera*; the choice of building materials in regard to durability, cost and appearance; the general inside planning of the house with special reference to the needs of the housewife and the simplification of her work. In addition to all this some account must be taken of the design and collective appearance of the houses in an area. All men and women have some æsthetic sense, even if it only lies dormant; man has a spiritual side of his nature which reacts on his bodily and mental health, and this side of him will be subserved, whether he realizes it or not, if he lives in beautiful rather than in drab surroundings, healthy otherwise though they may be. It is clear that no one person or set of persons with identical training and experience is competent to deal effectively with all the aspects of this complex problem. A complete and comprehensive scheme will be evolved only by the collaboration of all who are qualified to make a contribution.

Two reports have recently appeared which are the work of responsible organizations. The first has been published in *The Bulletin of the Sydney Division, The Institution of Engineers, Australia*, of October, 1943. The statement has been prepared as evidence to be submitted to the Commonwealth Housing Commission. After an initial observation that the problems of housing in the post-war period will be to a large extent problems of engineering, it is stated that the Sydney Division of The Institution of Engineers includes technical experts actively engaged in such work as site planning and preparation, water supply, sewage disposal, electricity and gas supply for lighting, heating and power, provision of transport facilities by road and rail, and the efficient manufacture of fittings and appliances and the provision of radio and telephone equipment. The opinion is expressed that the advice and assistance of these men will be valuable to the Commission. The suggestion is that if the advice of the engineers is followed, better houses will be produced and at more attractive prices than prevailed in the past. It is insisted that the ultimate success of any housing scheme will depend upon the realization that housing is one aspect of the wider question of national planning and that therefore the first approach to the problem will involve its consideration in its correct setting. The homes of the people must be related to the employment from which they gain their livelihood, and therefore the solution of the housing problem can be really successful only in so far as the wider problem of organizing the national resources is effectively handled. The Sydney Division of The Institution of Engineers thinks that the first thing needed is a survey of the continent in regard to existing houses, the location of industry and the present condition of the facilities that would be needed. When this has been done, a national plan can be formulated. Under such a

plan the Commonwealth authorities should undertake the construction of a framework or broader outlines of national policy in regard to such matters as immigration, old and new industries, transport and communications, land settlement, primary production and defence. This having been done, the States, in collaboration with the local authorities, if necessary, would then have the task of developing the national plan within their own boundaries on a regional basis. All the factors of town planning will have to be considered. Pertinent remarks are made on the site of the home and its structure. It is suggested that land should be resumed at its agricultural value, and, when developed, sold at a moderate price to the *bona fide* home builder. The profit from the sale of such land should, it is held, be distributed among the public utility organizations providing the various services, thereby reducing their capital investment and ultimately benefiting the community through lower fares, lower rates, lower power charges *et cetera*. Presumably this land would be sold by the authorities directly to the *bona fide* home builder, the man who would live in the home, and would not be allowed to pass into the hands of a parasitic land speculator or other "middle man" who would "have to have his percentage". Suggestions are also made about the preservation of the residential character of the streets. In regard to the structure of the home, the reduction in its cost is a problem in which the engineer is to play a major part. The adoption of the principle of standardization with regard to building materials as well as the fittings and equipment of houses would enable the homes of even those in the lower income groups to be provided with "all those amenities and conveniences which should be a normal feature of a modern civilized existence". A most important point is that with standardization new materials will need to be found and old materials to be improved. This can be done, it is believed, by the cooperation of chemists, architects, engineers, manufacturers and workmen. The result will be homes of reduced weight and decreased cost. But all this will call for a revision of the building regulations of the various States.

A similar conclusion in regard to building regulations is made by the New South Wales Chapter of the Royal Australian Institute of Architects in an interim report submitted in September, 1943, by its Post-War Development Committee. The ideas of the architects are in many ways similar to those of the engineers. They want to see surveys undertaken so that knowledge shall be gained of all resources and physical features, actual and potential, of the country and of the lives and activities of the people, for a national plan of post-war development must be based on this knowledge. The National Planning Body envisaged by the architects would be concerned with all the aspects of Australian life covered by the survey advocated by them. They hold that it should "have a continuing function to obtain benefit from the accumulation of knowledge and experience"; that its task should be "continuous national planning, not the formation of a fixed plan"; that it must have "the standing of a major instrument and be in close touch with the source of national policy"; that it "must have very carefully devised machinery for coordinating its relations with the various Government Departments obviously involved". Housing is described as one of the possible emergencies likely to develop before the end of the war. A section of the report deals with building-industry organization. In addition to suggestions thought likely to make the building industry the better able to cope with post-war requirements, the discussion includes reference to standardization, new methods of construction and prefabrication. What appears to be a wise recommendation is that laboratory and field experiments should be undertaken in regard to prefabrication—such research is looked on as a matter of extreme urgency. Another recommendation which must appeal to the untutored layman is that all persons wishing to undertake the occupation of "builder" should be required to "measure up" to a high standard of education, practical experience and business credit. In the opinion of many persons the unscrupulous and inefficient builder and the middle man, already mentioned, are likely to be a serious handicap in any properly designed housing scheme. The effect of their mischievous dealings can readily be imagined, but these need only passing reference in the present discussion. The architects' committee deals in a separate section with codes and standards and sets out what in its opinion are the minimum standards necessary for the various details of home units. As these are matters of detail they need not be set out in this discussion. The important view is expressed that in order to enable the building industry to use its technical manpower to a proper and efficient degree, the general fields in which town planners, architects and engineers should work, ought to be defined and a full study should be made to ensure effective collaboration between them.

Medical practitioners, on becoming acquainted with the statements by the engineers and the architects, will naturally ask what medicine has been doing. As has been pointed out, the Federal Council has declared that something must be done about housing, but has taken no further action. The National Health and Medical Research Council expects at its next meeting, which will be held shortly, to receive a report on housing from Sir Raphael Cilento and Dr. E. Sydney Morris. That the practising members of the profession failed to initiate such an investigation through their own official organization, is to be regretted, but it is some satisfaction that medicine's point of view is to be stated. Engineering, architecture and medicine have three points of view in this matter, but these points of view are by no means divergent. They have much in common and they have the same objective, which may be described as the well-being of the community. The Government means to do something about housing; it must do something. And the Government will have every right to look for advice and assistance to those qualified by training and knowledge to give it—engineers, architects and doctors. It will not look in vain, but it will be helped most and will be the more likely to accept advice if those giving it speak with one voice and not three. Engineering, architecture and medicine should come together and make a comprehensive statement for presentation to the Commonwealth Housing Commission, with an offer of further detailed assistance as it may be required. One of the three must take the initial step and invite the others to cooperate. The National Health and Medical Research Council is urged to take this step and to do it without delay.

Current Comment.

HEADACHES.

THE extensive studies of Graham and Wolff and their colleagues led them to the conclusion that headaches are vascular in origin.[1] In 1927 Leake *et alii* postulated that headaches could arise from changes in volume or pressure of any of the three fluid or semi-fluid media within the rigid confines of the skull.[2] They defined these three semi-fluid media as the blood, the brain and the cerebro-spinal fluid. It has generally been assumed that the structures from which nociceptive impulses can arise within the cranial vault are the blood vessels, the dura, the *tentorium cerebelli* and the *falx cerebri*. Some recent work cannot escape the criticism that adequate safeguards have not been taken to ensure that the pain is really central and not a trigeminal diffusion from a peripheral focus. Sir Leonard Hill several years ago pointed out that air heated by a stove can bring about congestion of the highly vascular nasal mucous membranes and that what is termed a headache results. Even experienced clinicians have not infrequently discovered in themselves that a so-called headache is really caused by an incipient boil or acne pustule in the region of the fifth nerve. Just as the neuralgia of half a century ago, often treated by gelsemium, was really in many cases pain radiated from a carious tooth, so certain of the headaches of today have a nasal, an ocular or an aural origin.

Recently investigators in the Departments of Pharmacology of the University of Chicago and Wayne University Medical Schools have drawn attention to two types of true headache which they think should be separated in any classificatory system from the "common headache".[3] One is the "relaxation headache"—"the typical Sunday morning headache of the business man, the Monday headache of the clergy, the day-off headache of the nurse and the post-examination headache of the student". It is worth noting in this connexion, as we learn from the brilliant biography written by his descendant, the British Prime Minister, that the famous Duke of Marlborough suffered severely, after each battle was over, from a headache which phlebotomy relieved. These American investigators believe that in the "relaxation headache" and also in the migraine headache there is a diminution of the blood volume. The other type of headache is the caffeine-withdrawal headache. Lack of the usual morning coffee has led to many Americans experiencing a headache relieved quickly by administration of caffeine or acetyl salicylic acid. In an experimental study caffeine was given each morning to a number of medical students in gradually increasing doses up to twelve grains. On withdrawal headaches resulted, many of them severe with sense of fullness or throbbing in the head. This type of headache the authors attribute to "increase in the effective arterial blood volume". The critical reader of these articles, whilst admiring the ingenuity of the analysis and admitting most of the facts, will hesitate to accept without further confirmation the simple dynamical explanations put forward. In the growing literature of headache causation widely different conditions will be found to be emphasized as causative or contributory, such as diminished calcium in the blood, rise in the plasma protein, alteration of the blood phosphates and of blood potassium. Until some consistency is reached and until the site of the pain is proved beyond debate, the general practitioner will prefer to continue the treatment he has found effective even if this is labelled empirical by his colleague in the laboratory.

[1] J. R. Graham and H. G. Wolff: "Mechanism of Migraine Headache and Action of Ergotamine Tartrate", *Association for Research in Nervous and Mental Diseases, Proceedings*, Volume XVIII, 1937, page 638.

[2] C. D. Leake, A. S. Loevanhart and C. W. Muehlberger: "Dilatation of Cerebral Blood Vessels as Factor in Headache", *The Journal of the American Medical Association*, Volume LXXXVIII, 1927, page 1076.

[3] C. Pfeiffer, R. H. Dreisbach, C. C. Roby and H. G. Glass: "The Etiology of the Migraine Syndrome: A Physiologic Approach", *Journal of Laboratory and Clinical Medicine*, Volume XXVIII, July, 1943, page 1219.

THE ACTION OF THE SULPHONAMIDES: SOME LIMITATIONS.

FOLLOWING the acceptance in clinical medicine of the topical application of sulphonamide compounds to wounds it is not surprising that other methods of using these drugs should have been suggested. It was soon found, however, by J. L. Brown that cavities containing pus, such as *empyema thoracis*, responded to irrigations in the same way whether sulphonamides or saline solution was used.[1] Since then our knowledge of the action of the sulphonamides has been rapidly extended and their inactivity in the presence of pus is now explained. Apparently the sulphonamides act by competing with para-aminobenzoic acid and displacing it from bacterial enzymatic reactions. The chemical formulæ of the clinically active sulphonamide compounds and of a para-aminobenzoic acid have in common the benzene ring with the amino group in the para position; and it is probably to this similarity in chemical structure that the sulphonamides owe their effectiveness. As a result of the bacteriostasis so produced the defences of the body are better able to cope with the infecting organisms. This relationship between para-aminobenzoic acid and the sulphonamides is governed by the law of mass action: the presence of a relatively large amount of para-aminobenzoic acid permits bacterial metabolism to occur normally and inhibits the action of the sulphonamides. Such an excess of para-aminobenzoic acid is found in pus.

As each new sulphonamide is introduced claims are made of its effectiveness against staphylococci, but so far these claims have not been fully substantiated. Perhaps some day a sulphonamide will be discovered which is really effective against these ubiquitous organisms. Be that as it may, it may be prophesied that it will still be inactive in the presence of pus. The future is not so black as it would seem, however, for it is hoped that eventually penicillin, which functions in the presence of pus, will be more readily available. As a corollary to the mode of action of the sulphonamides it would seem logical to employ para-aminobenzoic acid as an antidote for the toxic complications of sulphonamide therapy. This has already been done in the blood dyscrasias, and if para-aminobenzoic acid proves to be at all effective in these cases it should quickly displace the relatively ineffective pentnucleotide.

With a few exceptions, of which "Nupercaine" (a derivative of cinchoninic acid) is the most important, most of the local anæsthetic agents now in use, including procaine (or "Novocain"), are para-aminobenzoates. Although it is only as would be expected from the theory of action of the sulphonamides, it is with interest that we read the report of Casten, Fried and Hallman[2] of the inhibitory effect of procaine on the bacteriostatic action of sulphathiazole. These authors used rabbits in which the sacrospinalis was traumatized and the wound contaminated with *Staphylococcus aureus*. Sulphathiazole was found to prevent infection in 60% of the wounds, but when 2% procaine solution was applied "in amounts ordinarily used clinically" the bacteriostatic effect of the sulphathiazole was eliminated in all cases. The conclusions from their experiments go to confirm the findings of J. W. Legge and E. B. Durie who recorded their investigation of the antagonism between procaine and the sulphonamides in this journal in the issue of December 26, 1942. Legge and Durie's experiments were carried out with sulphanilamide. They suggested that procaine or similar local anæsthetic agents should not be employed if any of the sulphonamide drugs were being used in the presence of severe infections or massive tissue injury. If the use of both agents was unavoidable, a possible contingency, either the sulphonamide would have to be used in increased amounts or the anæsthetic agent much diluted. It is doubtful, however, whether either would be effective.

[1] J. L. Brown: "Prontosil by the Intrapleural Route: Two Cases of Streptococci Empyema", *British Medical Journal*, Volume I, 1937, page 1157.

[2] D. Casten, J. J. Fried and F. A. Hallman: *Surgery, Gynecology and Obstetrics*, June, 1943, page 726.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Influenza Virus and Fowl Red Cells.

C. H. STUART HARRIS (*The British Journal of Experimental Pathology*, February, 1943) has recorded observations on the agglutination of fowl red cells by influenza virus. He compared the ease and reliability of obtaining results by Hirst's original technique and by titration methods, and preferred the former. He examined the factors causing variation in the results, and found that different egg fluids infected with the same strain of virus could produce differences in results with the same serum; also red cells from different fowls could produce variations in results. Groups of specimens of serum collected during the winter of 1941-1942 were tested by the method described above in a search for evidence of influenza in the respiratory diseases occurring in military institutions, but no differences in titre could be demonstrated, and in support of this all inoculation experiments using garglings and nasal washings in search of virus gave negative results. These findings are in contrast with those of the previous winter, when differences in titre had indicated positive results, which had been borne out by the isolation of influenza virus from these patients.

Biotin and Malaria.

WILLIAM TRAGER (*The Journal of Experimental Medicine*, June 1, 1943) has studied the effect of biotin upon susceptibility to malaria. He had previously studied the influence of this essential growth factor, and had shown that its lack increased the severity of infection. He used both chickens and ducklings, infected with *Plasmodium lophurae* and *Plasmodium cathemerium*, and reproduced biotin deficiency in groups of birds by feeding them on diets in which casein was replaced by dried egg white. Estimations of biotin and of pantothenic acid were carried out in control animals on normal and on deficient diets, and inoculation with approximately similar doses of parasites produced much severer infection in the birds deficient in biotin; although where there was no deficiency of biotin but a marked lack of pantothenic acid, no increased susceptibility was found. The addition of a small amount of biotin to the diet of biotin-deficient birds tended to lessen the severity of the infection; addition of biotin to the diet of birds already receiving a sufficiency did not affect the course of the malarial infection.

Staphylococcal Enterotoxin.

F. FULTON (*The British Journal of Experimental Pathology*, April, 1943) has studied the validity of the test first devised by Dolman, Wilson and Cockcroft, for the detection of enterotoxin in staphylococcal filtrates, by producing vomiting in kittens after intraperitoneal injection. A filtrate which produced vomiting in a human volunteer failed with a kitten, and conversely a strain producing vomiting in kittens had no effect on the same human volunteer. Selective tests on the two lysins, α and β, were attempted after their purification. The α lysin with a titre of 1 in 100 in two millilitre doses gave uniformly positive results in the kitten, and these were abolished if the lysin had been treated with a specific antiserum, while the purified β lysin behaved similarly, but was effective in much smaller doses. Under the conditions of the original test the β lysin was the only one to escape destruction by boiling and therefore is responsible for the positive result of the test, while a strain of staphylococcus not producing it will give a negative result in a kitten test, though producing an effective filtrate in a human volunteer. Many other substances injected intraperitoneally caused vomiting in kittens. The experiments in humans showed that β lysin was not toxic when given by mouth, and some α lysins were also not toxic. On the other hand, in those which did induce vomiting, α lysin and enterotoxin could not be separated. The author believes that human volunteers are the only reliable subjects for the experimental investigation of the problem of the food-poisoning staphylococci.

Influenza Virus in Cells of the Respiratory Tract.

G. K. HIRST (*The Journal of Experimental Medicine*, August, 1943) has studied the adsorption of influenza virus on the cells of the respiratory tract, as an extension of his observations on the adsorption and release of that virus by avian red cells. A technique for perfusing isolated ferret lungs was evolved, by which the trachea could be used to introduce fluids by the natural route and the side effects of the agglutination by virus of red cells could be avoided. The experiments showed that the cells of the respiratory tract rapidly adsorbed large amounts of virus introduced by the trachea, and that this virus was released after a short time. The effect was more marked with the Lee strain of influenza B than with the A strain PR8. After the cells of the respiratory tract had released virus, they appeared incapable of repeating the process. If the virus had been robbed of its infectivity by heat or by formalin, the cells of the respiratory tract could adsorb it, but not release it. This last observation constituted the chief difference in behaviour between avian red cells and respiratory mucosa. In the living ferret, in which red blood cells were circulating, the phenomenon of adsorption and release of virus took longer to demonstrate. The author suggests that some specific receptor substance is concerned; possibly it may have to be removed by virus or enzyme action, to allow infection and parasitism of the susceptible cell by the influenza virus.

Streptococci in Ulcerative Colitis.

ENID C. RODANICHE, W. L. PALMER AND J. B. KIRSNER (*The Journal of Infectious Diseases*, May-June, 1943) have studied the streptococci in the fæces of patients with non-specific ulcerative colitis and the effects of oral administration of sulphonamide compounds on them. This followed previous work in which the authors showed that sulphonamide treatment could alter the fæcal flora so that Gram-positive cocci instead of colon bacilli became the predominating organisms. Ten patients were investigated, and also six normal persons as controls. No strain of streptococci producing β hæmolysis was encountered amongst the 216 strains examined. The predominant type was *Streptococcus fæcalis*, fermenting dextrose and lactose, failing to liquefy gelatin, growing in ox bile and surviving heating to 62·5° C. for thirty minutes. *Streptococcus liquefaciens*, which did liquefy gelatin, was isolated from the fæces of normal persons and some of the patients. Three patients with ulcerative colitis yielded strains of *Streptococcus salivarius*, which were heat-sensitive and would not grow in bile. Virulence tests on selected representative cultures were carried out on mice, and no pathogenicity could be demonstrated in any strain. After sulphonamide treatment, when a variety of compounds was used, the cultivation of streptococci from the fæces was much easier, owing to the diminution in the numbers of *Bacillus coli*. *Streptococcus fæcalis* was still the predominating type after such therapy, and there was no alteration in the types found generally.

HYGIENE.

Urban Air Pollution and Respiratory Diseases.

CLARENCE A. MILLS (*American Journal of Hygiene*, March, 1943) states that in both Cincinnatti and Pittsburgh the maps of sootfall and of pneumonia deaths are strongly correlated, the areas of smog (smoke with fog) notably so. The elevated sites and the rural district do not show such high figures. It has been assumed in the past that associated socio-economic factors (rents, overcrowding, wages) are responsible, but while death rates from tuberculosis among males and females are but little different in higher levels and in the sooty districts, the pneumonia death rates among males are twice as great as among females. Rural males and females show little difference. If socio-economic factors were responsible, the opposite should be the case as the male is usually better fed. Soft coal fires, as in the household grate, more readily produce the low temperature volatilizing cancer-producing compounds of tar, while the high temperature stoked fire is almost free. The finer the particle, the more deeply are the particles inhaled. The author claims that the lung cancer rate in the sooty area and areas downwind is four times the figure for the less smoky hilltops. The cold weather fog in still weather is, however, most concerned. The fine siliceous ash residue and the sulphur content also count in bringing about a low-grade irritation—sinusitis, bronchitis and so on. Clarification of city air is indicated as a major health measure. The hazard is much greater for city industrial workers than for their wives. Respiratory diseases including influenza account for 70% of the working time lost by illness. Two days saved would pay the total cost of smoke clearance, not to mention savings in dry cleaning

and laundry cost. Four remedies are needed—use of low volatile coal or equipment for smokeless burning of high volatile varieties, effective trapping of fly ash in all flues, preliminary washing of high sulphur coals, and the use of Diesel or electric power within metropolitan areas.

Brucellosis.

CARL F. JORDAN *et alii* (*American Journal of Public Health*, July, 1943) discuss the epidemiology, diagnosis and control of brucellosis. They state that Iowa shows an average annual rate of 6·25 cases of brucellosis per 100,000 population, over three times the national figure. Direct contact with infected hogs and cows is the most frequent cause, but contaminated milk is also important. Besides *Brucella abortus*, *Brucella suis* may gain access to the udder of a dairy cow and prove to be more active in giving rise to human disease. Following up an adult patient infected by raw dairy milk, the authors found that nine out of thirteen cows proved reactors to the agglutination test for Bang's disease. In this area 147 persons were given agglutination tests and 28·6% of 63 supplied by the dairy gave positives and 20·2% in 84 supplied by other dairies. Intradermal tests with brucella nucleoprotein (brucellergen) were carried out in 170 cases. Of 71 dairy customers tested, 10 gave reactions, and out of 99 others, 12 yielded reactions. In the child group one to nine years, all those drinking contaminated milk, thirteen in all, failed to yield skin reactions. Following a second clinical case, 77 persons gave positive results to agglutination tests and 13 out of 29 blood cultures gave *Brucella suis*. Both hogs and cows on the dairy farm concerned had the same infection. Of 204 other consumers tested, 12 out of 33 drinking the milk gave positive results, but none of 171 consumers of other supplies. The intradermal series of tests revealed 42 positives out of 57 persons exposed, but only 17 out of 158 others. The blood test is best, agglutination second only to the blood test. From economic and health standpoints, brucellosis is an important epizootic and none but carefully pasteurized dairy products should be used.

Studies on the Nutrition of Tapeworms.

ASA C. CHANDLER (*American Journal of Hygiene*, March, 1943) has studied the nutrition of tapeworms. *Hymenolepsis diminuta* in albino rats was used. All proteins and vitamins were excluded from the diet of the hosts, with controls receiving vitamins with no protein, protein but no vitamins, and complete diet respectively. A diet without protein caused loss of weight in the rats, but the establishment, growth and reproduction of the worms were unaffected. The worms were unusually large. Diet without vitamins had no effect on worms in male rats, except their reproductive capacity; but in female rats failure of the worms to establish themselves was striking. In rats lacking vitamin *A* and protein the few who survived were exceptionally well grown, but those lacking vitamin *D* and protein growth also were very poor. In further diet studies it was found that complete lack of carbohydrates reduced the establishment of worms and severely stunted growth (to 1/10). Lack of vitamins *A*, *D*, *E* and B_1 had no effect, but lack of the vitamin *G* complex produced definite stunting. Worms seem to absorb nitrogenous substances directly from mucous membranes and also vitamin B_1, but are sensitive to restriction of carbohydrate in the food. The withholding of vitamin *B* complex affects worms in female but not in male rats. Symptoms of worm infestation may thus be due not to toxic effects, but to vitamin and protein absorption, especially induced vitamin B_1 deficiency, and may explain why these are often symptomless in the well-nourished. The effect of *Diphyllobothrium latum* in inducing pernicious anæmia may be due to lack of some constituent of the vitamin *G* complex.

The Prevalence of Pneumococci in the Throats of a Group of Homeless Men.

W. G. SMILLIE *et alii* (*American Journal of Hygiene*, March, 1943) have studied the naso-pharyngeal flora of occupants of a municipal lodging house of 850 beds situated in New York. Most were over fifty years of age and many were alcoholic derelicts of all strata in society. Some were semi-permanent occupants; most were casuals. The dormitories held 250 bunks in double tiers arranged in rows three feet apart. In a random sample of 111, 643 strains of pneumococci were found in the naso-pharyngeal cultures. One man carried seven. Direct examination revealed 59% positives, intraperitoneal inoculation of mice added 18%, the heart blood being best. In March and April (spring) a higher incidence of carriers is usually found, but in this group the high incidence existing masked any seasonal change. Types III (15%), VII (12·6%) and XXI (11·7%) were most frequent; then came Types XXV, XI and XX; then Types XVIII, XIX and XXXI. These, though normal inhabitants, are potentially dangerous. Invasive power varies. Pneumococcus Types I and II in more than 3% have epidemic significance. Type III as a rule does not. Yet Types III, VII and VIII have all been found in adult epidemics and Types VI and XIV in children's institutions. The persistence of the pattern in individual throats was very constant. Contrary to experience the appearance of a Type II in four individuals did not cause further spread or begin an epidemic of pneumonia.

Flexner Dysentery.

W. A. CALDWELL AND S. W. HARDWICK (*Edinburgh Medical Journal*, March, 1943) describe an outbreak of Flexner dysentery in a mental hospital in Surrey; 357 cases occurred in 18 months. The onset coincided with the hurried transfer of mental patients from older mental hospitals following air-raid damage. The peak periods of the disease were mid-winter and early spring. This may be due to closer contact among patients in these months. In summer the patients spend a large part of the day away from the wards where they sleep. No cases occurred among parole patients who were free to go about outside the ward. The epidemic began in a female ward, and in spite of precautions appeared in other wards five weeks later. Feces plated on McConkey's medium gave only 12% of positive results; later, when the desoxycholate citrate method was used 70% positive Flexner findings were recorded. The positive results were higher in stool cultures than from rectal swabbings and the latter procedure was finally abandoned. The symptoms were as a rule mild, lasting usually only three or four days. They comprised sudden onset of abdominal pain, with or without vomiting, tenderness over the colon, followed by frequent loose stools containing mucus and often blood. The symptoms rarely lasted more than ten days, but the organism continued to be excreted for an average of 32 days with a maximum of 208 days. Treatment was satisfactory with sodium sulphate, sulphapyridine and sulphaguanidine. Sulphaguanidine was given for seven days, three doses of three grammes for two days, then two doses of two grammes for five days. The earlier the treatment began, the better the results, and the sooner the stools became "negative". Firor claims that succinyl sulphathiazole has higher antibacterial potency, low toxicity and absorbability against *Bacillus dysenteriæ*. The mortality rate was under 4%, and in the fatal cases other diseases such as tuberculosis were usually factors in the *dénouement*. Prophylactic vaccine was given to 1,100 patients, 250 and 500 million organisms in two separate doses at a week's interval. Results were not good. The vaccine may be of value if given at once to other patients in the ward, in doses of 500 and 1,000 million. Non-specific prophylaxis included transfer to special infectious wards and retention in those wards until more than three stools were "negative". In doubtful cases a buffer ward was utilized before the patients returned to the general wards. Quarantine for 21 days was practised in wards where only one or two sporadic cases occurred, all patients' stools being examined bacteriologically during this time. Disinfection of excreta, lavatories, crockery and clothing was carried out, and garden lavatories were boarded up to prevent cross infection. The water from the laundries, washing machines, hydros, floor *et cetera* was tested bacteriologically and found absolutely sterile. When the diarrhœa reached epidemic proportions, it was found that many stools gave positive Flexner findings, although the patients had no symptoms nor signs of the disease. These symptomless patients as a rule excreted the bacillus for only about two or three weeks. Nine out of fourteen nurses employed admitted having had symptoms suggesting Flexner infection such as relaxed stools for twenty-four to forty-eight hours, or abdominal pains.

Isolation of Meningococcus from the Genito-Urinary Tract.

C. M. CARPENTER AND RUTH CHARLES (*American Journal of Public Health*, June, 1942) report that 103 strains of Gram-negative diplococci were isolated from patients suffering from gonorrhœa or from carriers; seven of the 103 proved to have the characteristics of the meningococcus. The significance is unknown. The question arises whether a gonococcus can under any conditions change into a meningococcus.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on September 23, 1943, at Sydney Hospital. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the hospital. Part of this report appeared in the issue of November 20, 1943.

Carcinoma of the Breast.

DR. A. T. NISBET'S first patient was a woman, aged twenty-seven years, who was first examined in December, 1941. At that time she gave a history of "a lump in the left breast and armpit for twelve months". On examination the whole of the tissue of the left breast was found to be replaced with large, irregular, hard, craggy nodules, some distinct, some diffuse. The axillary tail of the breast was enlarged, and there were several hard glands, much increased in size, in the left axilla. The patient had consulted her medical adviser on account of pain in the lumbar part of the spine. X-ray examination revealed partial collapse of the body of the third lumbar vertebra; the appearance was suggestive of metastatic invasion of this bone. The general condition of the woman was excellent.

A course of deep X-ray therapy was given immediately to the left breast, the left axilla and the lumbar part of the spine. On January 5, 1942, the patient complained of continuous and severe pain in the neck. X-ray films disclosed a destructive lesion involving the sixth and seventh cervical vertebræ, and in March, 1942, collapse of the bodies of the first, second and third lumbar vertebræ occurred. All areas found to be involved were irradiated with X rays. Clinical examination at the time of the meeting disclosed that the breast was soft and showed no departure from normal in appearance. X-ray films of the various segments of the spine revealed recalcification of the affected areas. The patient was suffering no pain and played tennis occasionally.

Dr. Nisbet stressed the point that in young people the malignant cell was much more active than in older persons; as a result metastases arose rapidly, so that the prognosis was not nearly so good as for more elderly subjects.

The second patient shown by Dr. Nisbet was a female, aged forty-nine years, who had first been examined by him in July, 1942; until that month she had consulted no doctor. She gave a history of having had a lump in the right breast for over two years, but she had come for examination only on account of pain in the lumbar region, which had steadily been increasing for the last three months.

On examination, a tumour measuring five by four centimetres was found, involving the lateral quadrant of the right breast. The mass was attached to the skin, through which the lesion was just about to break. Freely movable glands were felt in the right axilla, and several small "shotty" glands in the right supraclavicular area. No biopsy was considered advisable or necessary. On the following day X-ray examination of the lumbar part of the spine revealed collapse of the bodies of the third and fourth lumbar vertebræ, apparently metastatic in origin. An intensive course of X-ray treatment was undertaken, lasting just on fifty days. The right breast was irradiated from its lateral and medial aspects, the supraclavicular and axillary areas anteriorly and posteriorly. At the time of the meeting, there was in the breast a small nodule measuring 1·5 centimetres square; it was smooth in outline and without any apparent induration outside this small mass. The smaller gland in the axilla was not palpable and the larger gland had been considerably reduced in size. X-ray examination of the spine revealed sclerosis of the affected segments of the dorsal portion of the spine. The patient had been "feeling extremely well" until three weeks prior to the meeting, when she had some slight recurrence of pain. Dr. Nisbet said that for that reason the lumbar region would be given further irradiation immediately.

Dr. Nisbet said that the expectation of life in the cases of mammary carcinoma in patients of that age was difficult to assess. Once the malignant cell had decided to invade the skeletal framework, it might be years before any other body tissue was infiltrated; as a result of the bony invasion pain made itself felt at an early stage, and whether radiographic evidence was there or not, radiation therapy was immediately advisable. In other cases the neoplastic cell apparently thought that lymphoid or pulmonary tissue was the better choice, and in that case metastases in the bony framework were uncommon.

A MEETING of the Western Australian Branch of the British Medical Association was held on July 21, 1943, at Perth.

Pain.

CAPTAIN M. KELLY, Australian Army Medical Corps, discussed recent advances in the study of pain. He said that vague concepts of pain, which had held until recently, had been replaced by the idea of pain as a distinct and separate sense, with its own receptors, nerve fibres and tracts in the central nervous system. Studies on the peripheral mechanism of pain had not kept pace with the work of Head and his successors on the pathways of pain sense, and pain was generally held to be produced by the over-stimulation of the receptors of touch, warmth and other senses. The chief reason for this error was the fact that pain could be elicited by a great variety of stimuli; but an analysis of these stimuli demonstrated that they shared a common factor—damage to the tissues. The true function of pain, as described by Trotter, was to herald impending damage rather than to record the infliction of damage. The hypothesis of Head relating to two peripheral systems—the epicritic and the protopathic—had not been able to survive the enlightened criticism of Trotter and Walshe.

Captain Kelly went on to say that the work which the late Professor Woollard had brought to fruition just before his death had proved beyond doubt that cutaneous pain was subserved by a plexus of nerve fibres in the skin, which terminated in free nerve endings. A similar plexus was found in all those somatic structures which were painful to mechanical stimulation (deep fascia, periosteum, arteries, tooth pulp, *membrana tympani et cetera*); the correspondence was so general that there could be little doubt that the endings described comprised the specialized receptors for pain. The work of Woollard corresponded happily with that of Lewis upon hyperalgesia. From his observations Lewis deduced the existence of a plexus in the skin which mediated the spread of hyperalgesia from an injured spot. "Antidromic" stimulation of a sensory nerve also produced hyperalgesia in the area of its distribution. Lewis considered that the production of hyperalgesia was by a process of secretion; a substance was liberated at the nerve endings which rendered pain receptors more sensitive. Lewis did not agree with the opinions of Woollard and Walshe that the pain plexus possessed all the qualities required of this branching system, and he gave it a special name—"nocifensor" fibres. The later work of Lewis and Kellgren upon deep pain indicated that pain from all deep structures, whether somatic or visceral, was identical in quality and quite unlike cutaneous pain. Lewis and Kellgren drew the conclusion that the deep pain system was entirely separate from that of cutaneous pain; much subsequent work indicated the fundamental truth of that fact, and the importance of its clinical applications.

With regard to referred pain, Captain Kelly said that pain from lesions in muscle (artificial or pathological) radiated widely and was accompanied by referred tenderness of the deeper structures. The presence of tenderness indicated that a physical change had taken place in the structures to which the pain was "referred"—that a deep hyperalgesia had spread by nervous reflexes mediated through the pain plexus in the deep structures. The conclusions drawn from somatic referred pain were valid for visceral pain, for the same deep system was involved. Cutaneous hyperalgesia accompanied referred pain in only a few cases; deep tenderness was much more common and much more significant. Though Lewis had not committed himself so far, the conclusion seemed to be inescapable that in the pain of disease (either visceral or somatic), pain receptors in somatic structures were always involved through the liberation of "pain substance" by reflex antidromic stimulation. The "adequate stimulus" for pain from the bowel was a stimulus adequate to set this reflex in motion. Many questions remained unanswered, and many lines of research suggested themselves. Captain Kelly concluded his remarks by referring to certain errors commonly held in relation to pain, and to the light thrown by recent research on the various obscure pains which were responsible for the bulk of medical practice.

Medical Societies.

MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held on August 6, 1943, at the Institute of Medical and Veterinary Science, Adelaide.

Vitamins.

MR. H. R. MARSTON gave a brief outline of the present state of knowledge in respect to the more important vitamins. He accompanied this with a general account of the methods used to estimate them biologically and chemically. In the case of a vitamin "complex", which might consist of a number of substances, chemical methods might estimate one or more, but not all of them. The biological method estimated all, and integrated such matters as differences of absorption. Although biological methods were more exact and gave more information than chemical methods, both were necessary for the achievement of the complete picture. The contribution of microbiological workers to knowledge of the vitamins was illustrated by the separation of "bios" into its five constituent vitamins.

Antibacterial Substances Produced by Moulds.

MISS NANCY ATKINSON discussed the biological assay of antibacterial substances produced by moulds. She said that Fleming had demonstrated the antibacterial activity of penicillin by placing the penicillin fluid in a trough cut out of an agar plate on which were streaks of various bacterial cultures. According to their sensitivity to penicillin, the growth of these organisms was inhibited as it approached the trough. For quantitative measurement Florey developed the ring test, in which an agar plate was covered with some broth culture of *Staphylococcus aureus* and dried, and a small ring or cylinder was sealed to the centre of the plate. The fluid to be assayed was placed in the ring, and on incubation of the plate the staphylococcal growth was inhibited around the ring to an extent depending on the concentration of penicillin, provided this was not too strong. A solution of purely arbitrary strength was adopted as a standard, and the "Oxford unit" of penicillin was defined as that amount of penicillin which, when dissolved in one millilitre of water, gave the same inhibition as the standard. Miss Atkinson said that no chemical test was yet available for detection or estimation of penicillin. For estimation of the amount of penicillin in blood or body fluids the ring test was not always satisfactory. Therefore, Rammelkamp, in the United States of America, devised another method; twofold dilutions of the fluid were made in veal broth and inoculated with a Group A hæmolytic streptococcus, which was sixteen times more sensitive to penicillin than *Staphylococcus aureus*; 1% of erythrocytes were also added, and growth of the streptococcus caused lysis of those cells, which, therefore, acted as an indicator. The highest dilution inhibiting growth was the titre.

Miss Atkinson went on to say that she and her colleagues estimated the activity of their own mould product, penicidin, by Florey's ring method, and by the dilution method, in which they used a special synthetic medium to which casein-hydrolysate was added. The test organism was *Bacterium typhosum*. They had found that the activity of penicidin preparations correlated fairly well with the value obtained in a titration against ceric sulphate. If the correlation was further confirmed, much time would be saved by the substitution of this simple chemical method for the biological method.

Miss Atkinson further said that a new method of estimating antibacterial activity had been devised by Rake and his colleagues in the United States of America and applied to the mould product aspergillic acid. This substance affected the luminescence of *Photobacterium fischeri*. The latter organism, cultured in ocean water medium, was mixed with falling dilutions of aspergillic acid preparations, of which the titre was the highest dilution that just inhibited luminescence after thirty minutes. The titre correlated well with that obtained by means of the usual dilution method with a Group A hæmolytic streptococcus.

A Practical Application of Fildes's Theory of Antiseptic Action.

Fildes's theory of antiseptic action was discussed at the meeting. It was pointed out that Fildes considered that antibacterial substances acted through interference with essential metabolic reactions of the cell. Frequently this action took the form of a competitive enzyme inhibition. In that case the antibacterial substance bore a structural resemblance to an "essential metabolite". Therefore, according to that theory, structural resemblance to an essential metabolite should produce antiseptic properties which would be antagonized by the addition of extra essential metabolite. McIlwain had investigated many substances which he called "metabolic analogues", and had obtained results supporting Fildes's hypothesis. For example, pantothenic acid was an essential metabolite, and its analogue, pantoyl taurine, possessed antibacterial activity which was antagonized by pantothenate. McIlwain estimated by microbiological titration *in vitro* the pantothenate concentration in the body fluids of various animals, the antibacterial activity of pantoyl taurine against a strain of hæmolytic streptococcus, and the amount of pantothenate which antagonized a given amount of pantoyl taurine. From those values he was able to calculate the dose of pantoyl taurine which should be effective *in vivo* against infection with the hæmolytic streptococcus. This calculated value, based entirely on tests *in vitro*, protected rats against infection. The validity of this deduction of action *in vivo* from *in vitro* methods was confirmed by artificial elevation of the blood pantothenate level of rats, when the previously effective dosage of pantoyl taurine became ineffective. McIlwain had applied the same method to sulphanilamide and its antagonist *p*-aminobenzoic acid.

A MEETING of the Medical Sciences Club of South Australia was held on September 3, 1943, at the Institute of Medical and Veterinary Science, Adelaide.

Demyelination.

PROFESSOR E. WESTON HURST read a paper entitled "Further Observations on Demyelination". He said that a simple domestic *"mayonnaise"* containing globules of a size which blocked only vessels of capillary calibre might produce demyelination when injected into one carotid artery of a sheep. Lesions developed chiefly in areas where a number of closely adjacent capillaries were obstructed. They were larger and more numerous in the white matter of the brain, where they often took the form of demyelination. As in repeated anoxia of chemical origin, the white matter appeared much more susceptible to minor disturbance than the grey matter, and demyelination appeared to be the response of the white matter to injuries short of those wholly fatal. In "nervous distemper" of dogs, which had been shown to be a direct effect of infection with the virus of distemper, demyelinating lesions again represented injuries to the white matter short of those completely lethal to the tissues. Demyelination appeared to be a non-specific result of a number of quite different processes. There was no reason, therefore, to suppose that the diverse demyelinating diseases of man were due to a single ætiological agent.

Congenital Defects following Maternal Rubella.

DR. C. S. SWAN read a paper entitled "Congenital Defects in Infants following Maternal Rubella in Pregnancy". He said that an investigation had recently been carried out in South Australia by Dr. A. L. Tostevin, the late Dr. Brian Moore, Dr. Helen Mayo, Dr. G. H. Barham Black and himself. A paper on this subject by C. S. Swan, A. L. Tostevin, Brian Moore, Helen Mayo and G. H. B. Black was published in this journal in the issue of September 11, 1943, at page 201.

National Emergency Measures.

NATIONAL SECURITY (MEDICAL COORDINATION AND EQUIPMENT) REGULATIONS.

THE following amendment of the Emergency Medical Service order has been published in the *Commonwealth of Australia Gazette*, Number 236, of November 8, 1943.

In pursuance of regulation 37 of the National Security (Medical Coordination and Equipment) Regulations, I, James Mackintosh Fraser, Minister of State for Health and Minister of State for Social Services, acting for and on behalf of the Minister of State for Defence, hereby order as follows:

1. Paragraph 2 of the Emergency Medical Service Order is revoked and the following paragraph inserted in its stead:

Charges for Medical Services.

"2. Any person to whom any medical service is rendered by a member of the Emergency Medical Service who is directed to serve in any position in which the duties include general civil practice, and is in receipt of pay and allowances from the Commonwealth in pursuance of regulation 30 of the National Security (Medical Coordination and Equipment) Regulations, shall pay to the Department of Health the charge specified in the Schedule to this Order in respect of that service."

2. Paragraph 5 of the Emergency Medical Service Order is revoked and the following paragraph inserted in its stead:

Payment by Instalments, Reduction and Waiver of Charges.

"5. Where it is established to the satisfaction of the Director-General of the Emergency Medical Service that the financial circumstances of any person who is liable to pay any charges for medical service under this Order are such as to justify the payment of the charges by instalments, the Director-General may approve of the payment of the charges by instalments, and, in any case in which he is of opinion that payment of the charges by any person would entail serious hardship, the Director-General may reduce the charges or waive the payment of the charges by that person."

Amendments of the Schedule.

3. The Schedule to the Emergency Medical Service Order is amended—

(a) by omitting paragraph 1 and inserting the following paragraph:

"1. Visits and consultations—ordinary or uncomplicated cases—

Where the treatment does not extend beyond one week—

	At home or hospital.	At surgery.
	£ s. d.	£ s. d.
First visit	0 10 6	0 7 6
Second and subsequent visits ..	0 7 6	0 7 6

Where treatment extends beyond one week, at the following weekly rates:

	At home or hospital.	At surgery.
	£ s. d.	£ s. d.
First week	2 2 0	1 17 6
Second week	1 10 0	1 10 0
Third and successive weeks ..	1 2 6	1 2 6

or at the rate of 7s. 6d. per visit, whichever is the less.

When two or more persons in the same house are visited at the same time and all the charges are paid by the same person the charges shall be at full rates for the first patient and at half rate for each of the other patients.

For consultation with another practitioner—£2 2s. (*plus* mileage).";

(b) by omitting paragraph 3 and inserting instead the following paragraph:

"3. Mileage—

Country.—Two miles free. Beyond two miles (one way only), 8 a.m. to 8 p.m., at the rate of 5s. per mile; 8 p.m. to 8 a.m., at the rate of 7s. 6d. per mile.

Metropolitan.—Two miles free. Beyond two miles (one way only), 8 a.m. to 8 p.m., at the rate of 3s. 6d. per mile; 8 p.m. to 8 a.m., at the rate of 5s. per mile.

Mileage charges so payable shall be calculated from the doctor's surgery.

When two or more visits are made on the same trip, mileage charges shall be shared between the persons to whom medical services are rendered.

When transport is provided for the member of the Emergency Medical Service by or on behalf of the patient, the charge shall be 10s. 6d. per half hour of travelling time.

No mileage charge will be made—

(i) where the Director-General of the Emergency Medical Service has approved of the member of the Emergency Medical Service giving regular service at an outlying township or centre on fixed days for consultations and visits—in respect of such consultations and visits; and

(ii) where the member of the Emergency Medical Service shares in a reciprocal arrangement with neighbouring practitioners for the administration of anæsthetics for one another—in respect of necessary travelling for this purpose.";

(c) by adding the following items at the end of paragraph 9:

	£ s. d.
"Opening an abscess or whitlow (simple, uncomplicated, with subsequent dressings at "subsequent visits" rates) ..	1 1 0
Reduction of strangulated hernia	2 2 0
Extraction of teeth—	
For extraction of one, two or three teeth, or any deciduous teeth, consultation fee of	0 10 6
For extraction of four or more teeth ..	1 1 0
Paracentesis tympani	2 2 0
Spinal puncture (without laboratory examination)	2 2 0
Injections (cost of drug, vaccine, &c., to be added except where specified as inclusive)—	
Intravenous injection (blood substitute)	2 2 0
Intravenous injection (medicament)	1 1 0
Subcutaneous or intramuscular injection: When essential part of treatment on visit or consultation (e.g. morphia, coramine, pituitrin)—No charge except inclusive fee for visit, consultation, or the procedure involved in the visit.	
Other injections (including charge for visit)—	
On first occasion	0 10 6
On second occasion	0 7 6
When course continues over two weeks, on each occasion	0 5 0
For diphtheria or pertussis immunization (vaccine to be provided by patient)—	
Course of injections for one or two children of the same family	1 1 0
Course of injections for each additional child	0 10 6
Mass immunization (when municipality or other agency provides facilities and equipment)—	
For each session of one hour	1 1 0
Vaccination against smallpox	0 10 6
Allergy tests when these are an essential part of visit or consultation, for purposes of diagnosis—No charge other than the actual cost of the material used and inclusive fee for visit.";	

and

(d) by omitting paragraph 10 and inserting in its stead the following paragraph:

"10. Midwifery—	£ s. d.
To include ordinary antenatal care, attendance at confinement, and post-natal attendance to the tenth day ..	5 5 0
Where antenatal care is given over a period, but without attendance at the confinement	1 1 0
Curettage	5 5 0
Suturing of perineum (when not in attendance at the confinement) ..	1 1 0".

Dated this second day of November, 1943.

J. M. FRASER,
for and on behalf of the Minister of State for Defence.

Correspondence.

THE NERVOUS SOLDIER.

SIR: I ask your permission to comment on certain paragraphs, to which my attention has been drawn by returned soldiers, in the admirable and most opportune brochure by Professor John Bostock and Dr. Evan Jones entitled "The Nervous Soldier". I do not here enter into the professional questions involved (though these, too, invite discussion—as

the statement in the preface which places "nervous invalidism" as "first on the list as a cause of inefficiency"), but am concerned with the reaction on the part of the soldiers themselves to statements made and advice given therein on the matter of "malingering". I am the more inclined to think that these distinguished and highly regarded specialists adopt an attitude toward the soldier which is antithetic to that which I have extolled in the Official Medical History, and which is stated thus (page 91, Chapter 11, Volume III, *note*):

> The best (R.M.O.'s) reacted not with suspicion but with sympathy and co-operated in a common trial. But the R.M.O. must have his full share of the "Wisdom of the Serpent".

The attitude adopted by the authors of the brochure is stated as follows. When dealing with "The Psychology of the Soldier" they say (pages 26, 27):

> The medical officer must indeed regard every officer and man as a potential exaggerater. The reason is not far to seek.
>
> The rewards for successful simulation are not merely escape from tedium and terror, but also pecuniary gain or the expectation of a pension. Such motives are so overwhelming that it is not surprising that we have to deal not merely with the conscious malingerers and lead-swingers. These include the hysterics, the dramatic exaggeraters, the wingers and whiners who seek safety and solace through the good offices of the doctor. Undoubtedly these people would hotly resent an imputation of being malingerers, but they deceive themselves. Their only difference from the deliberate malingerer is that they lack insight into their motives.
>
> Whenever doubt arises it is wiser to consider that the man is a malingerer rather than that he may be a neurotic.

Instead of stating my own "reaction" to this I shall quote from the protest made by a member of the executive of the Australian Capital Territory Branch of the Returned Sailors, Soldiers and Airmen's Imperial League of Australia.

> This handbook, on its own admission, purports to have been written for the guidance of "medical officers and other officers responsible for the welfare and morale of the personnel under them". . . . Let us as laymen concede the technicalities to the experts and direct our attention as intelligent men to the common-sense aspect. This we are entitled to do as the booklet is addressed not only to the specialised minds of the medical profession, but also to "other officers responsible for the welfare and morale of the personnel under them", and can be bought over the counter for 3/-. We do not for a moment doubt the eminent authors' profound knowledge of psychiatry, but in a perusal of the earlier pages of their booklet we find evidence that they seem to have classified *all* minds into certain pathological categories.
>
> They may know all the answers when dealing with soldiers suffering with mental and nervous disorders, but what concerns us is the question: "Do they know anything about the normal soldier?" We submit that if they did a number of passages in their booklet . . . would never have been printed.
>
> The medical officer can damn his own prestige and ruin his chances and power for doing good if he accepts the advice of these eminent authors who "regard every officer and man" as a potential exaggerater motivated by pecuniary gain.

I need not protest my admiration for the work of Professor Bostock and Dr. Evan Jones for this and other of their writings: the Medical Service has great cause for gratitude to them. But I do suggest that the paragraphs quoted suggest defeat and disease, and the phraseology a negative rather than a positive attitude to the problem of morale. In the "Medical History" I have been at some pains to uphold "the greater virtue of positive efforts for *promotion of moral health*, rather than a negative effort for the *prevention and treatment of psychotic disorder*". And I venture to propose that this applies with even greater force in respect to "moral" than "mental" disorder.

I do not apologize for entering this *caveat* against advice given even by such distinguished specialists, since, as it seems to me, this is a matter for "busy common sense" almost as much as for clinical analysis. I would even suggest that the matter opens up still wider issues.

Yours, etc.,

A. G. BUTLER.

Australian War Memorial,
Canberra, A.C.T.,
November 5, 1943.

AN EPIDEMIC OF POLYARTHRITIS IN THE NORTHERN TERRITORY.

SIR: The epidemic of polyarthritis described by Lieutenant-Colonel Halliday and Lieutenant-Colonel Horan (THE MEDICAL JOURNAL OF AUSTRALIA, October 9, 1943) appears to resemble Haverhill fever, or *erythema arthriticum epidemicum*.

An epidemic of acute febrile polyarthritis, associated with a rash, broke out in 1926 in Haverhill, Massachusetts. Culture of the blood and joint fluid in some cases revealed an organism *"Haverhillia multiformis"*. Serum from all of the patients was found to agglutinate this organism.

Later, it became evident that the disease bore a close resemblance to some sporadic cases of rat-bite fever; and the organism responsible for the latter, *Streptobacillus moniliformis*, was discovered to be identical with *Haverhillia multiformis*. This variety of rat-bite fever bears no relation to the better-known Japanese variety, of which the causative organism is *Spirillum minus*. All cases of Haverhill fever, moreover, are not caused by rat bites.

The acute polyarthritis described by your contributors, however, differs from Haverhill fever in certain respects, notably in its gradual onset and milder symptoms. In many cases of the American disease a remittent pyrexia is seen, though it usually clears up entirely within four to six weeks (see P. S. Hench *et alii*, "Rheumatism Reviews").

Yours, etc.,

M. KELLY.

Perth,
Western Australia,
November 3, 1943.

RUBELLA AND CONGENITAL DEAF-MUTISM.

SIR: I have under my care one, K.T., *ætatis* three, a deaf mute, with a history of rubella at the age of two months. She was an eight-month premature baby, weight four and a half pounds. The mother did not have rubella during pregnancy.

Yours, etc.,

JAMES H. YOUNG.

Mount Hawthorn,
Western Australia,
November 7, 1943.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the *Medical Acts, 1939 to 1940*, of Queensland, as duly qualified medical practitioners:

Davies, Frances Dorothy Rees, M.B., B.S., 1943 (Univ. Queensland), c.o. Bank of New South Wales, 33, Queen Street, Brisbane.

Randolph-Bedford, Joy, M.B., B.S., 1943 (Univ. Queensland), 100, Sydney Street, New Farm.

Obituary.

ALEXANDER LEIPER.

WE regret to announce the death of Dr. Alexander Leiper, which occurred recently in Bombay.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Alexander, Thirza Alice, M.B., B.S., 1943 (Univ. Sydney), Base Hospital, Wagga Wagga.

Hercus, John Macky, M.B., 1942 (Univ. Sydney), Bank Chambers, 17, Bolton Street, Newcastle.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association, as from January 1, 1944:

Barrett, Cedric George, M.B., B.S., 1942 (Univ. Sydney), 77, Main Road, Speers Point.

Clements, Alan Twyman, M.B., B.S., 1941 (Univ. Sydney), NX149392, Captain A. T. Clements, A.A.M.C., R.H.Q., 2/1 Australian A/A Regiment, Composite, A.I.F., Australia.

Eastmuir, Grace Mary, M.B., B.S., 1939 (Univ. Sydney), 64, Bayswater Road, Rushcutters Bay.

O'Brien, John Patrick Edward, M.B., B.S., 1938 (Univ. Sydney), Major J. P. E. O'Brien, 53, Spit Road, Mosman.

Wiley, Thomas William, M.B., B.S., 1941 (Univ. Sydney), Captain T. W. Wiley, 12, Sutherland Road, Chatswood.

Williams, Dudley Clarence, M.B., 1939 (Univ. Sydney), NX116469, Major D. C. Williams, H.Q., 8th Australian Field Ambulance, A.I.F., Australia.

Rutherford, Keith Powell, M.B., Ch.M., 1924 (Univ. Sydney), 12, Douglas Street, Randwick.

Medical Appointments.

Dr. Gilbert Brown has been appointed temporary honorary anæsthetist at the Royal Adelaide Hospital.

Books Received.

"Diseases Affecting the Vulva", by Elizabeth Hunt, B.A., M.D., Ch.B. (Liverpool); Second Edition, revised; 1943. London: Henry Kimpton. 9" × 6", pp. 211. Price: 21s.

"A Synopsis of Surgical Anatomy", by Alexander Lee McGregor, M.Ch. (Edinburgh), F.R.C.S. (England); Fifth Edition; 1943. Bristol: John Wright and Sons Limited. London: Simpkin Marshall (1941) Limited. 7¼" × 5", pp. 725, with many illustrations. Price: 25s.

"A Guide to Anatomy, for Students of Medical Gymnastics, Massage and Medical Electricity, etc.", by E. D. Ewart; Fifth Edition; 1943. London: H. K. Lewis and Company, Limited. 8¼" × 5", pp. 322, with many illustrations. Price: 17s. 6d.

"The Queen Charlotte's Textbook of Obstetrics", by Members of the Clinical Staff of the Hospital; Sixth Edition; 1943. London: J. and A. Churchill, Limited. 9¼" × 6¾", pp. 589. Price: 25s.

"The Diagnosis and Treatment of Diabetes", by W. Wilson Ingram, M.C., M.D., F.R.A.C.P.; Fourth Edition; 1943. Sydney: Angus and Robertson Limited. 7¼" × 4", pp. 153. Price: 6s. 6d.

"Medicine and the Social Order", by E. P. Dark, M.C., M.B., Ch.M.; 1943. Sydney: Australasian Publishing Company Pty. Ltd., 8¼" × 5¼", pp. 118. Price: 3s. 6d.

"Sixth Addendum to the British Pharmacopœia, 1932", published under the direction of the General Council of Medical Education and Registration of the United Kingdom; 1943. London: Constable and Company Limited. Medium 8vo, pp. 48.

"Materia Medica for Nurses: A Textbook of Drugs and Therapeutics", by W. Gordon Sears, M.D. (London), M.R.C.P. (London); 1943. London: Edward Arnold and Company. 7¼" × 5", pp. 248. Price: 5s.

"The Anatomy of the Female Pelvis, Including a Description of the Placenta and its Formation and the Fœtal Circulation", by C. F. V. Smout, M.B., Ch.B., M.R.C.S., L.R.C.P., with sections in Part I by F. Jacoby, M.D., Ph.D., and a Foreword by Sir Beckwith Whitehouse, Ch.M., M.S., F.R.C.S., F.R.C.O.G., F.A.C.S. (Hon.); 1943. London: Edward Arnold and Company. 8¾" × 5¼", pp. 199, with many illustrations. Price: 35s.

"The Medical Annual: A Year Book of Treatment and Practitioner's Index", edited by Sir Henry Tidy, K.B.E., M.A., M.D. (Oxon.), F.R.C.P., and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.; 1943. Bristol: John Wright and Sons, Limited; London: Simpkin Marshall (1941), Limited. 8¼" × 5¼", pp. 432, with many illustrations.

"A Pocket Surgery", by Philip H. Mitchener, C.B.E., T.D., M.D., M.S. (London), F.R.C.S. (England), D.Ch. Hon. (Durham), D.L., and A. Hedley Whyte, D.S.O., M.B., M.S. (Durham), F.R.C.S. (England and Edinburgh); 1943. London: J. and A. Churchill Limited. 7¼" × 4", pp. 280, with 4 illustrations. Price: 10s. 6d.

"The Physiological Basis of Medical Practice", by Charles Herbert Best, M.A., M.D., D.Sc. (London), F.R.S., F.R.C.P. (Canada), and Norman Burke Taylor, M.D., F.R.S. (Canada), F.R.C.S. (Edinburgh), F.R.C.P. (Canada), M.R.C.S. (England), L.R.C.P. (London); Third Edition; 1943. London: Baillière, Tindall and Cox. 9¼" × 6", pp. 1957, with many illustrations. Price: 55s.

"The Happy Warrior", by Patrick Hore-Ruthven; 1943. Sydney: Angus and Robertson Limited. 8¼" × 5¼", with one illustration. Price: 4s. 6d.

"The Practice of Local Anæsthesia", by George Bankoff, M.D., D.Ch., F.R.F.P.S., F.R.C.S.E.; Revised Edition; 1943. London: William Heinemann (Medical Books) Limited. 8¼" × 5¼", pp. 252. Price: 17s. 6d.

"The Medical Annual: A Year Book of Treatment and Practitioner's Index", edited by Sir Henry Tidy, K.B.E., M.A., M.D. (Oxon.), F.R.C.P., and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.; 1943. Bristol: John Wright and Sons Limited. 8¼" × 5¼", pp. 567, with illustrations. Price: 25s. net.

Diary for the Month.

DEC. 1.—Victorian Branch, B.M.A.: Branch.
DEC. 1.—Victorian Branch, B.M.A.: Council.
DEC. 1.—Western Australian Branch, B.M.A.: Council.
DEC. 2.—New South Wales Branch, B.M.A.: Special Groups Committee.
DEC. 2.—South Australian Branch, B.M.A.: Council.
DEC. 7.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
DEC. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
DEC. 8.—Victorian Branch, B.M.A.: Council.
DEC. 9.—New South Wales Branch, B.M.A.: Branch.
DEC. 10.—Queensland Branch, B.M.A.: Annual Meeting.
DEC. 14.—New South Wales Branch, B.M.A.: Ethics Committee.
DEC. 14.—Tasmanian Branch, B.M.A.: Branch.
DEC. 17.—Queensland Branch, B.M.A.: Council.
DEC. 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.

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New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

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